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HOW TO MAKE A KITCHEN DRESSER.

BY F. JERMAN.

INTRODUCTION—DIFFERENT KINDS OF DRESSERS—MODERATION IN ORNAMENT — GENERAL DESCRIPTION AND DIMENSIONS—FRONT FRAMING—FRAMING AT ENDS, RAILS, AND BEARERS—POT-BOARD — SHELVES AND STANDARDS — DRESSER TOP AND SIDE BOARDING—DRAWERS—DOVETAILING—CUPBOARD FRONT—BACK—WOOD AND TREATMENT—CONCLUSION.

ARTICLES of furniture in daily use are very often made without consulting the wants of the inmates of the house for whose use they are intended. This remark is especially applicable to the ordinary kitchen dresser. In terrace houses the dresser is generally mentioned and described in the specification, and put up by the builder of the house, who gets his notion from a few words running after this fashion :—"Provide and fix in kitchen a dresser formed of 1 in. clean deal frame, sides, and top, 2 ft. wide, with two drawers and two cupboard leaves in bottom, all on stout bearers, with 1 in. deal shelves and pot-board. Put small bolt and turn-button to cupboard door, and fix two dozen cup and jug hooks at edge of shelves." The reader will see that not much idea of design is given in this clause; the size also is very lightly passed over. In consequence of this, dressers in most houses are erected in a character approaching sameness. Go into one of a terrace of houses, look at the dresser, and you have seen all of them. They can hardly be called articles of furniture, being generally landlords' fixtures, not to be taken away when the tenant removes.

Sometimes we see them without any shelf room provided, making the article look like

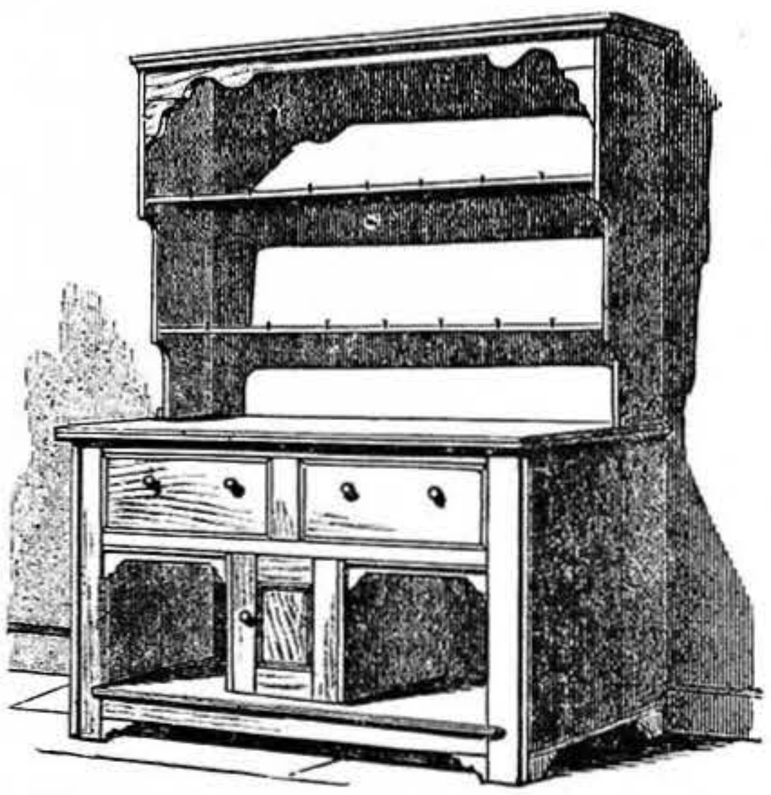

Fig. 3.—Perspective Sketch View of Dresser.

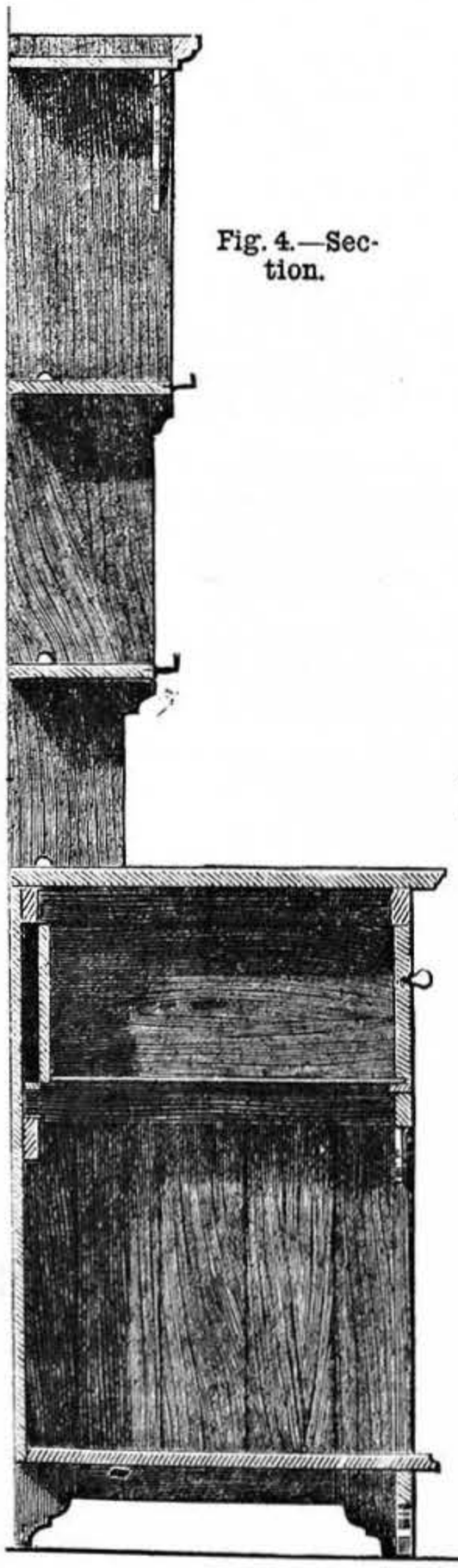

Fig. 4.—Section.

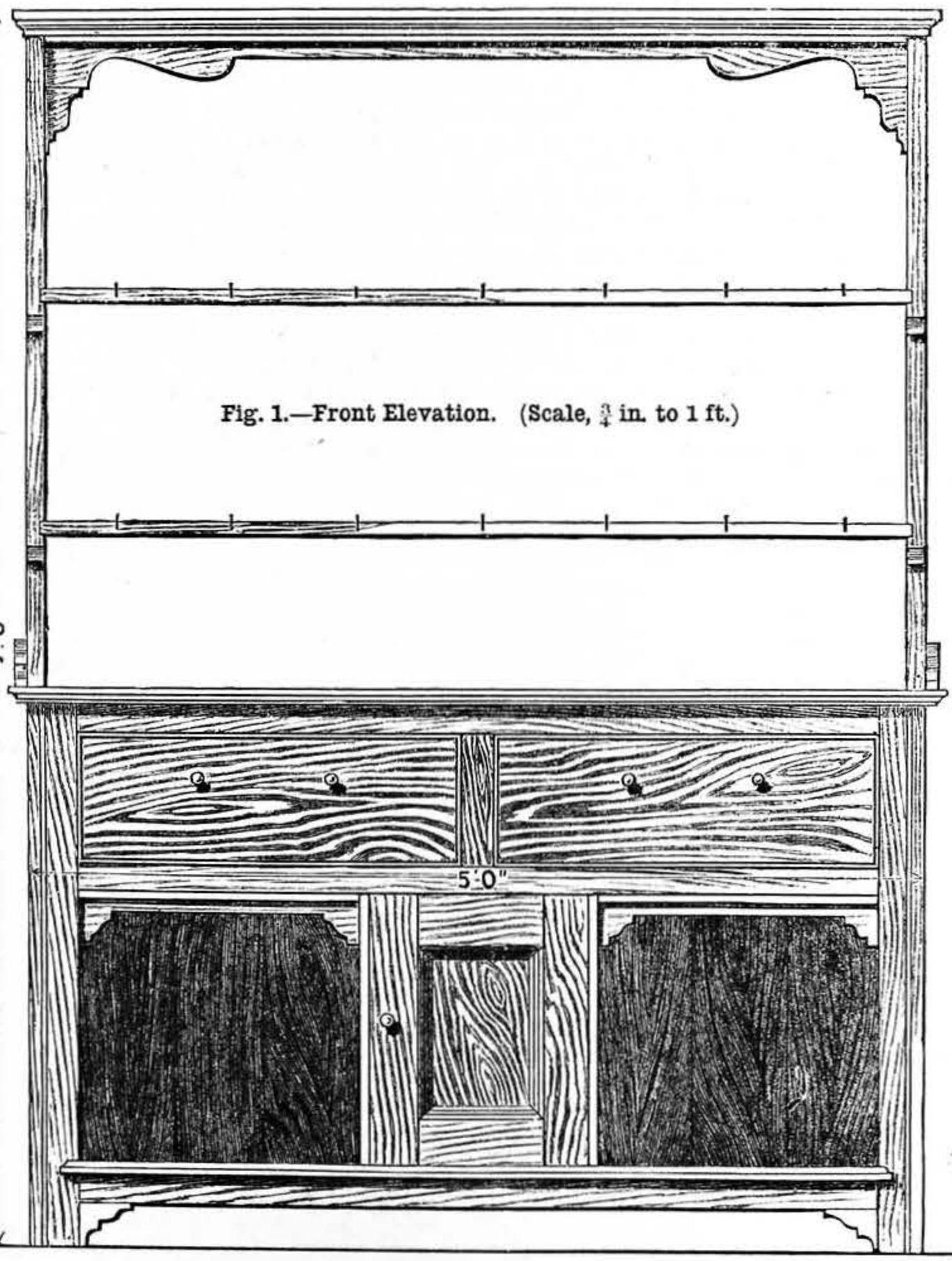

Fig. 1.—Front Elevation. (Scale, ¾ in. to 1 ft.)

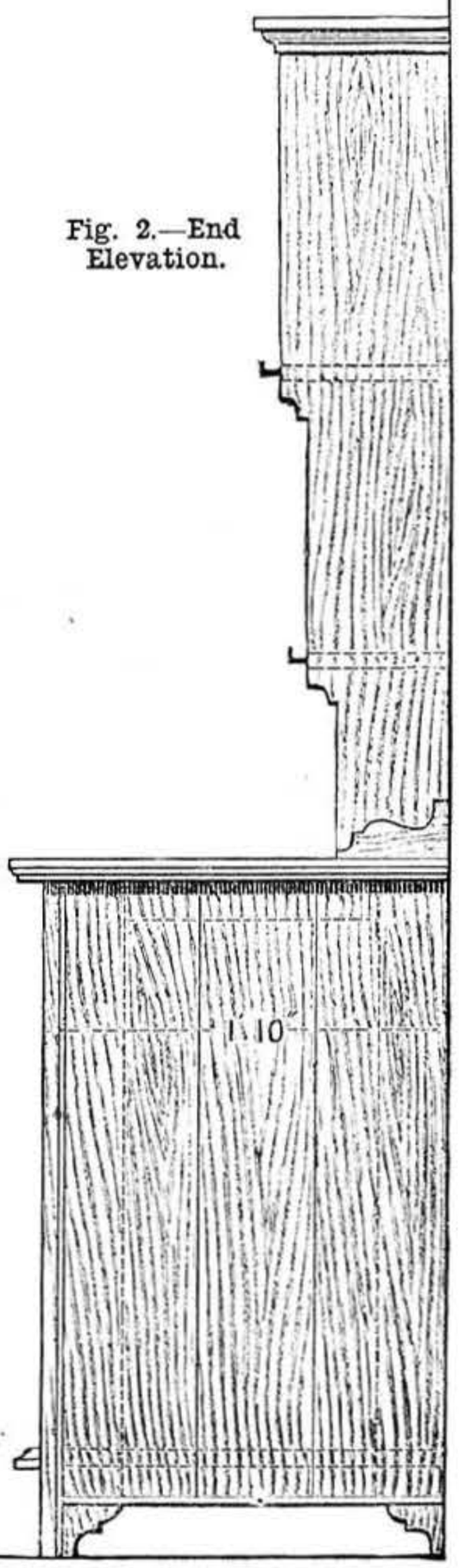

Fig. 2.—End Elevation.

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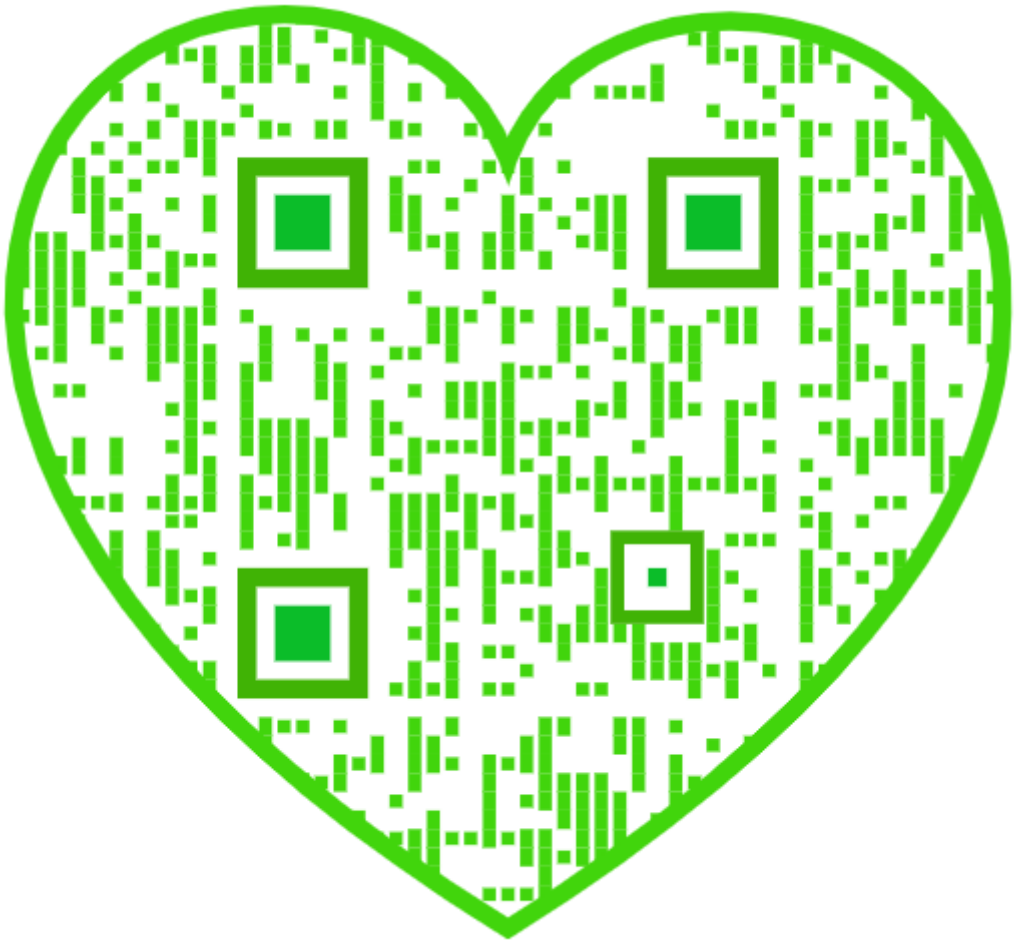

a very plain buffet or sideboard. On the other hand, a gaunt-looking stretch of shelves, knocked together without any thought of proportion, and reaching close up to the ceiling, serves the purpose of a dresser in some kitchens.

By this introduction I do not wish to convey to the reader an idea that a dresser should have a quantity of meaningless ornament, panelling, and mouldings stuck on; but that it should be strongly put together, at the same time with an eye to effect and proportion. Cut work can be introduced here and there, formed with the keyhole saw; and it is surprising how a little of this kind of ornament takes the baldness and commonplace look out of a simple design.

The dresser shown here, I think, fills the conditions mentioned above. It is made in two portions, the shelves and end standards forming one part, and the top, with two drawers, cupboard, etc., the other. In case of removal this will be found very convenient. The shelves must, however, be firmly fixed to the wall with L irons to prevent any likelihood of its tipping over. The total width is 5 ft., the breadth 1 ft. 10 in., and the height—7 ft.—is very convenient, being at the same time not out of proportion with the other dimensions; 3 ft. 2 in. from floor to top will be found suitable, at which height I have shown it.

The framed front had better be commenced first. It is formed of 3 in. by 1 in. upright pieces and 2 in. by 1 in. rails tenoned into them. A piece of 2 in. by 1 in. is also tenoned into the rails in the middle between the two drawers. The two upright pieces have beads worked on their edges, the length being 3 ft. 1 in., and the rails are 4 ft. 6 in., plus the tenons at each end, which will make the total length of rails 4 ft. 8 in.

The two ends are framed in a similar manner with the same sized stuff, but the stiles have cut ends to form supports as shown. Two rails are fixed at the back, in the position shown in section, tenoned into the sides. The framing and back rails can now be put together, the front to be screwed to the sides and the latter kept $\frac{3}{4}$ in. back from the face to allow for the matched boarding. Bearers must be fixed, two to each drawer, formed out of 2 in. by 1 in. stuff, with $\frac{1}{2}$ in. rebate, in which the drawer slides. They are tenoned into the front, halved, and then nailed on to the rail at back. The length, including tenon, of these bearers will be 1 ft. 9 in. Figs. 14, 15, and 16 show the method of fixing them.

The pot-board can be got out in two pieces. The sizes are to be found in Fig. 6, the total length being 4 ft. $10\frac{1}{2}$ in. and the width 1 ft. $10\frac{1}{2}$ in., cut out at angles to allow for stiles, etc. It projects 1 in. from the front, and has a moulding worked on its outer edge (see Fig. 9). The board has a bearing on the bottom rail of the side framing, shown by dotted lines in Fig. 6. It is also nailed at the front and back. Care should be taken in marking out these boards, so that they will fit closely together when in position without any crack between them. This pot-board is a very useful feature in a kitchen dresser, as a stand for pitchers, etc. The recesses on each side of the cupboard may serve as a place for boots and shoes. A $\frac{3}{4}$ in. board may be placed half-way up 20 in. in length and 9 in. in breadth, nailed to little ledges on each side, so as to give more shelf room if the recesses are used for this purpose. The divisions for cupboard are formed of $\frac{3}{4}$ in. stuff, rebated in front for door.

The end standards are 1 in. in thickness, 3 ft. 10 in. high, and with diminishing widths of 11 in., 9 in., and 7 in., and a hollow cut below each shelf. Grooves are cut $\frac{3}{8}$ in. deep for the shelves, 10 in. from the bottom for the first shelf, and 15 in. is the width between the first and second shelves. The shelves measure 4 ft. $10\frac{3}{4}$ in. by 11 in. and 4 ft. $10\frac{3}{4}$ in. by 9 in., fitting into the grooves in the end standards. As large articles are put away on the top shelf—such as tureens, etc., which are not used every day—it is generally made the widest. The shelves should be at least 1 in. thick. If they are any less in thickness they will require supports, which in some measure decreases the shelf space, and prove in the way when large dishes, etc., are placed there. A small strip is nailed on 3 in. or so from the back to keep plates, etc., upright in their place. Fourteen jug and cup hooks are shown to be screwed into the edges of shelves. The cornice of dresser (Fig. 7) is 2 in. deep, and a 11 in. by $\frac{1}{2}$ in. board is fixed at the top, but this latter can be omitted if desired. The cut spandrel beneath the cornice is formed of pieces of $\frac{1}{2}$ in. stuff fitting into a shallow groove in the sides. The upper piece is 4 ft. $10\frac{1}{2}$ in. long by 3 in. deep, and the two brackets below same are 4 in. by 3 in.

To return to the lower part of the dresser: the top can now be cut out, glued up together, and fixed. It is made of 1 in. stuff, and measures altogether 5 ft. 4 in. long by 2 ft. wide, and has an ogee mould worked on its edge. Two pieces of 7 in. by 4 in. are cut out of $\frac{1}{2}$ in. stuff, and screwed to the top in order to keep the shelves and standards which go between these pieces in place. The $\frac{3}{4}$ in. boarding at sides can now be nailed to the framing; the edge at the bottom is rounded as shown, and the edge against the wall is rebated for the boarding at back.

The knife drawers are made of $\frac{5}{8}$ in. stuff, cut to the sizes shown in Figs. 10 and 11, and with a groove $\frac{3}{4}$ in. from the bottom cut in the front and sides. These and the back are dovetailed together (see Figs. 12 and 13). It will be seen that the sides are dovetailed to the front in a different manner than they are to the back, the pins and sockets not being cut so deep in the front as at the back in order to let the drawer have a plain face, and allow the joints to be seen at the sides only. This is known as the lap dovetail. The dovetails in front must be cut out with the chisel only, but the tenon saw can be used in the sides and back for making the horizontal cuts for the sockets, which are then cut off with the chisel.

It is very important that drawers should be dovetailed together, as a great strain is put on the front when it is pulled out, especially if the contents are heavy. If the drawers are nailed they will not keep together very long. When all is ready, coat the dovetails with thin glue, hammer them together, then slide the bottom in the grooves from the back, and nail it up to the back piece, which is made less in height than the other sides to allow for same. Square blocks are then glued up in the ordinary way to the bottom of the drawers. Two wooden knobs screwed to each drawer will be required for pulling them out.

The cupboard front measures 18 in. by 15 in., and is formed of 3 in. by $\frac{3}{4}$ in. stiles and rails framed together with $\frac{3}{8}$ in. panel, and a small moulding run round outside same. Hang with a couple of butt hinges, and fix a brass turn-button to fasten door. Two 3 in. by 1 in. cut brackets are screwed below the bottom rail to the stiles. Half-inch spandrel pieces cut out of 20 in. by 3 in. stuff are fixed over the two recesses, and a bead is run round at the top against the rail to hide joint.

The back of dresser can be covered with $\frac{1}{2}$ in. boards, laid horizontally all up through; or, if preferred, the lower portion only may be treated in this manner, leaving the wall showing behind the shelves.

The wood used may be red deal, this being easier to work than the white, all to be painted at completion, except the top, which can be made of beech or sycamore, left clean planed off and not painted. The latter wood is very suitable for this purpose. Bread-plates and articles of a like nature are made of it, and as it has a very even grain splinters will not appear, no matter how hard it is scrubbed. If the remainder of the dresser is painted a stone colour it will form an excellent contrast with the white sycamore top.

The sketch (Fig. 3) will give an idea of how the dresser will appear in execution. Should there be any points which the reader may not be clear upon, I shall be glad to correspond with him through your "Shop" columns.

ARTISTIC LITHOGRAPHY.

BY MISS ADA J. ABRAHAM.

PRACTICAL WORK—CONCLUSION.

To lithograph a written circular or letter, pin the original to a drawing-board at each corner, then take a sheet of transfer paper, cutting it to the necessary size, and if the sketch is not subsequently required, gum the top of the transfer paper to the top of the letter, that being a safer way of securing it from slipping than if drawing pins were used; in such case make it further secure by using a paper weight, and all tracings should be done in the same manner. It should not be fixed at the bottom, as then it can be frequently lifted up to see if the lines are being followed correctly. The student must not forget that there is a right and wrong side to the paper, and he must use a hand-rest so as not to touch the paper if possible with the hand, or the heat will make it curl up.

Now write over the original very carefully either with the pen or brush, and be sure to notice the different thicknesses of the lines, and any peculiarity in the writing, not forgetting the stops, etc. If there be any ruling, place a small piece of cardboard on either side of the paper, and let the ruler rest on this, in order to avoid touching the drawing.

The ruling pen should be filled by means of an old brush, and not dipped into the ink, else the outside of the pen will soon get inky, and so smear the ruler, and likewise the drawing. The pens and brushes should invariably be tried first to see if they make lines, or dots, of the desired thickness; and this, mentioned now, should be followed out in every case.

After the writing is done, the artist's part of the work is so far finished, and it can now be handed over to the printer, who will first transfer it to stone, and then print the impressions from the stone. But the artist should always insist on seeing a proof first, to correct any mistakes. The drawing should be sent perfectly flat, and no tracings or writings should be rolled when drawn with lithographic ink.

If a mistake is noticed when the proof is submitted, or any of the lines do not print as black as the rest, it is necessary to retouch

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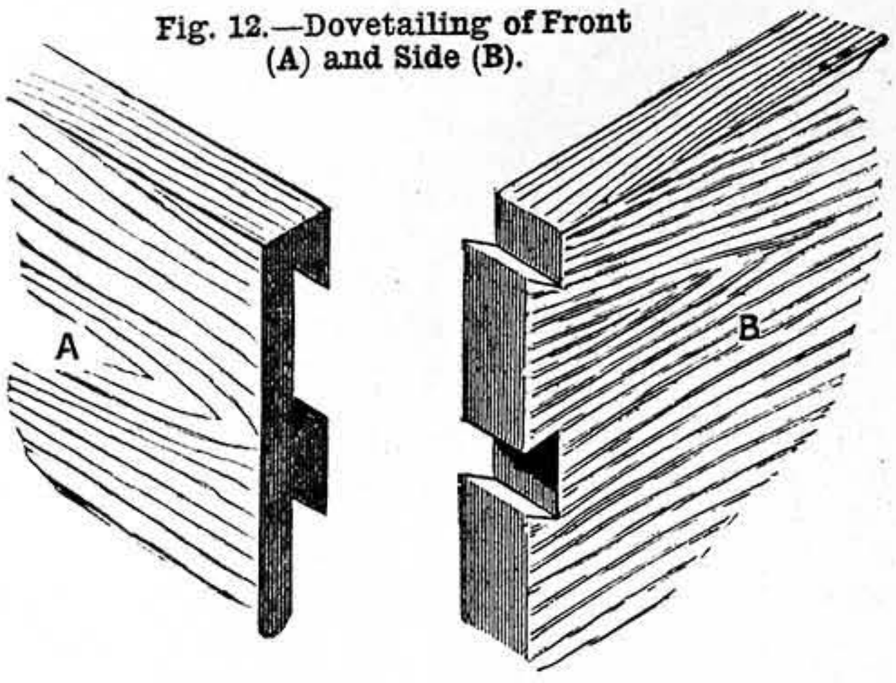

Fig. 12.—Dovetailing of Front (A) and Side (B).

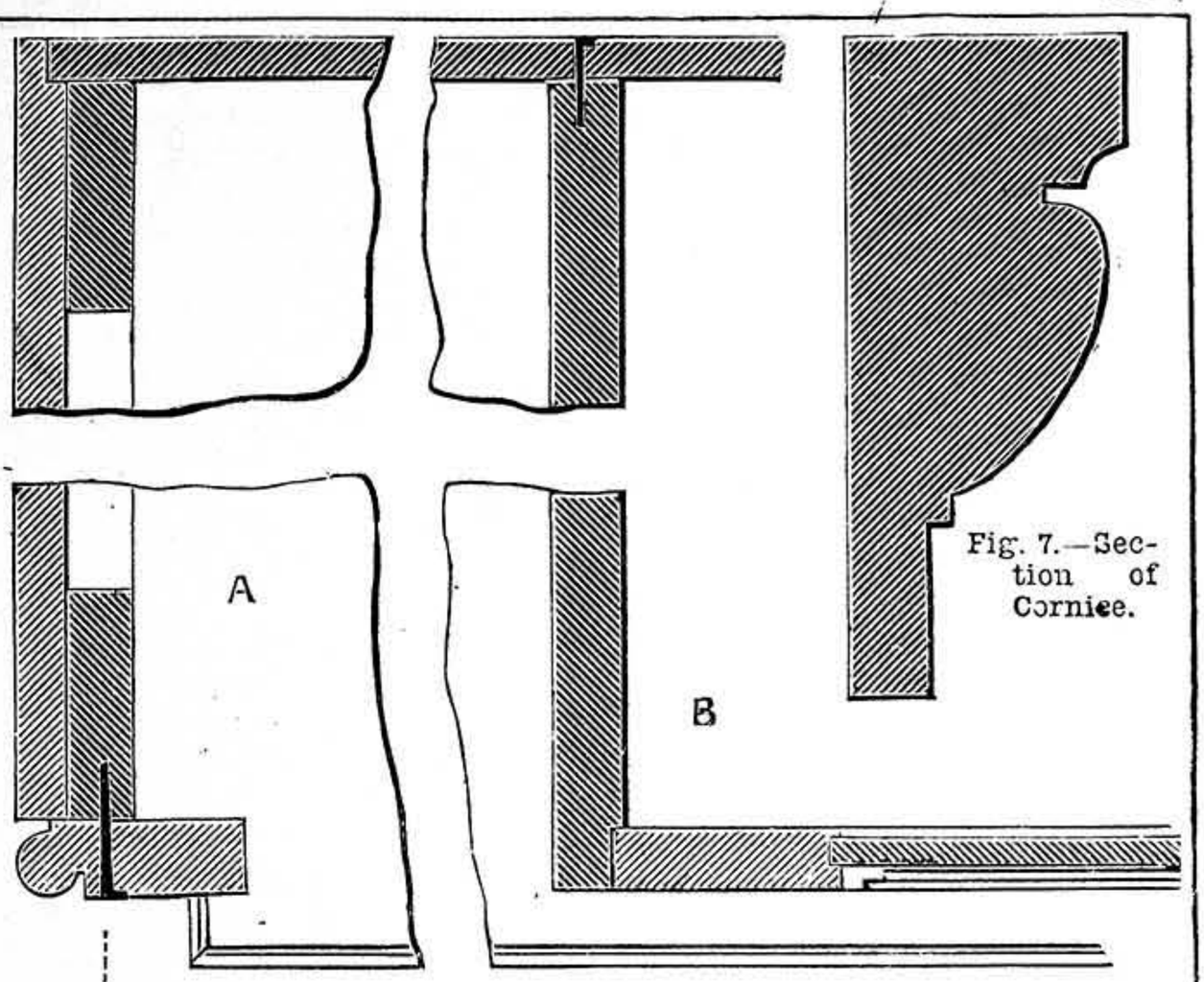

Fig. 5.—Detail of Part Plan—A, Recess; B, Cupboard.

*** Figs. 6, 7, 10, 11, 15, 19, are on Scale of 1½ in. to 1 ft.

Fig. 7.—Section of Cornice.

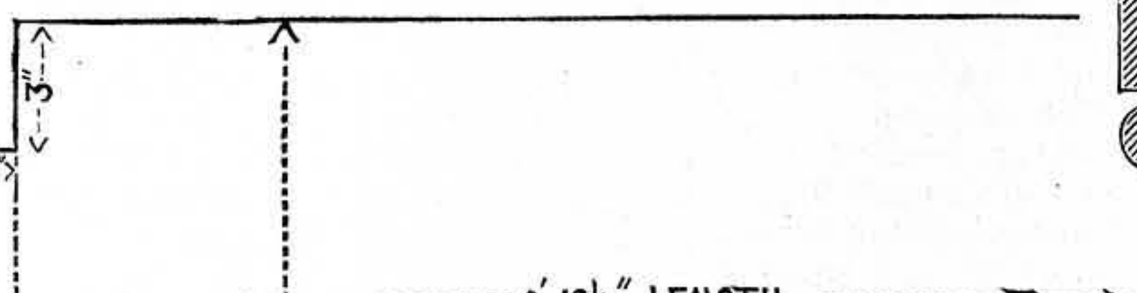

Fig. 6.—Plan of Pot-board, showing Dimensions.

Fig. 8.—Section of Shelf.

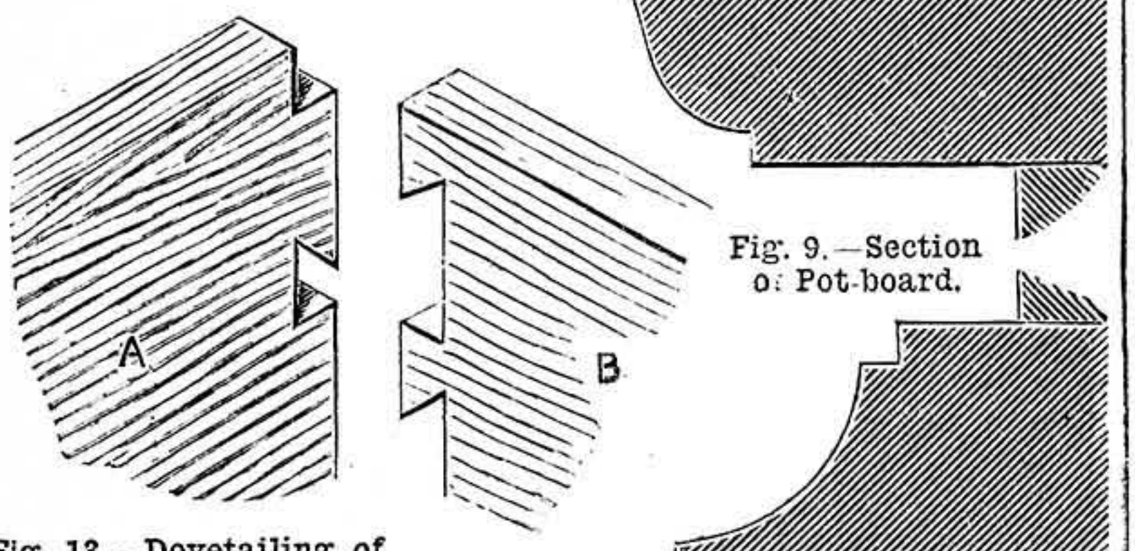

Fig. 13.—Dovetailing of Side (A) and Back (B).

Fig. 9.—Section of Pot-board.

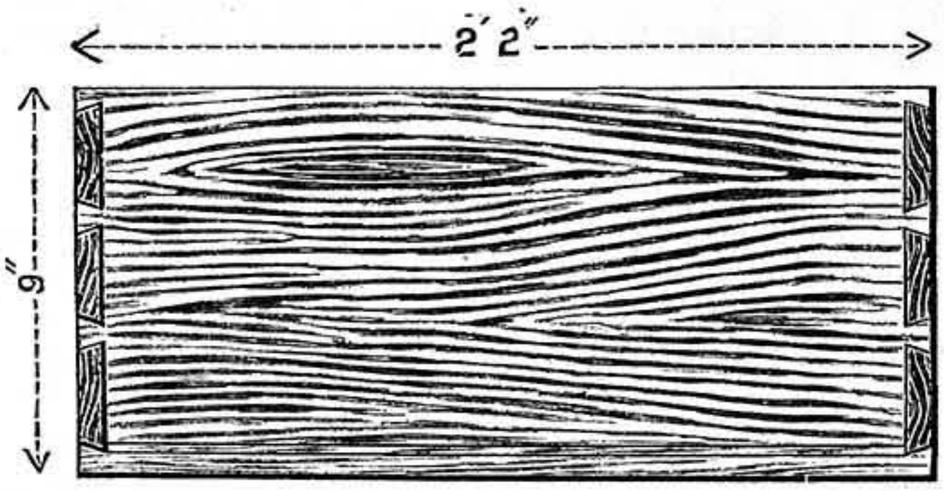

Fig. 10.—Front of Drawer from inside.

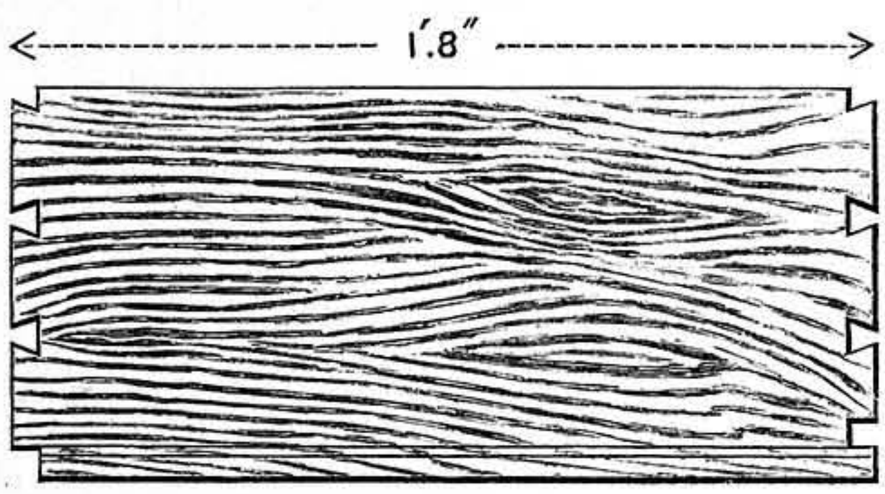

Fig. 11.—Side of Drawer.

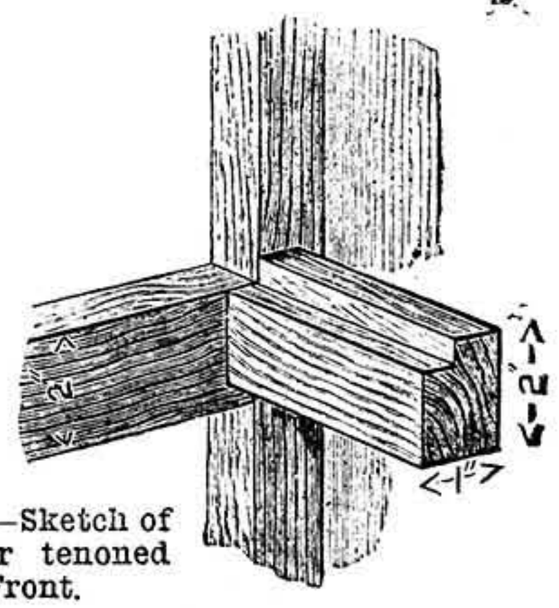

Fig. 16.—Sketch of Bearer tenoned into Front.

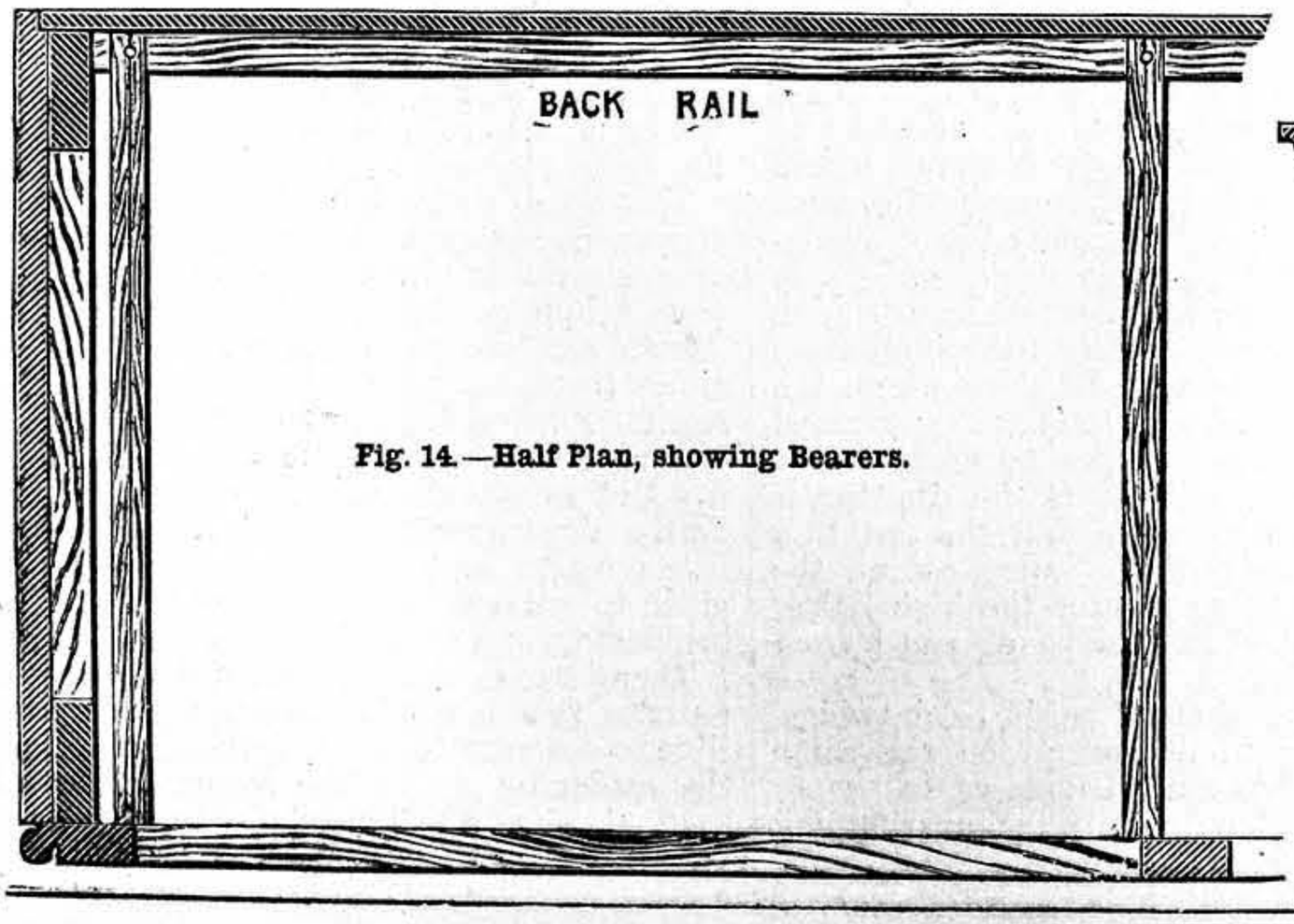

Fig. 14.—Half Plan, showing Bearers.

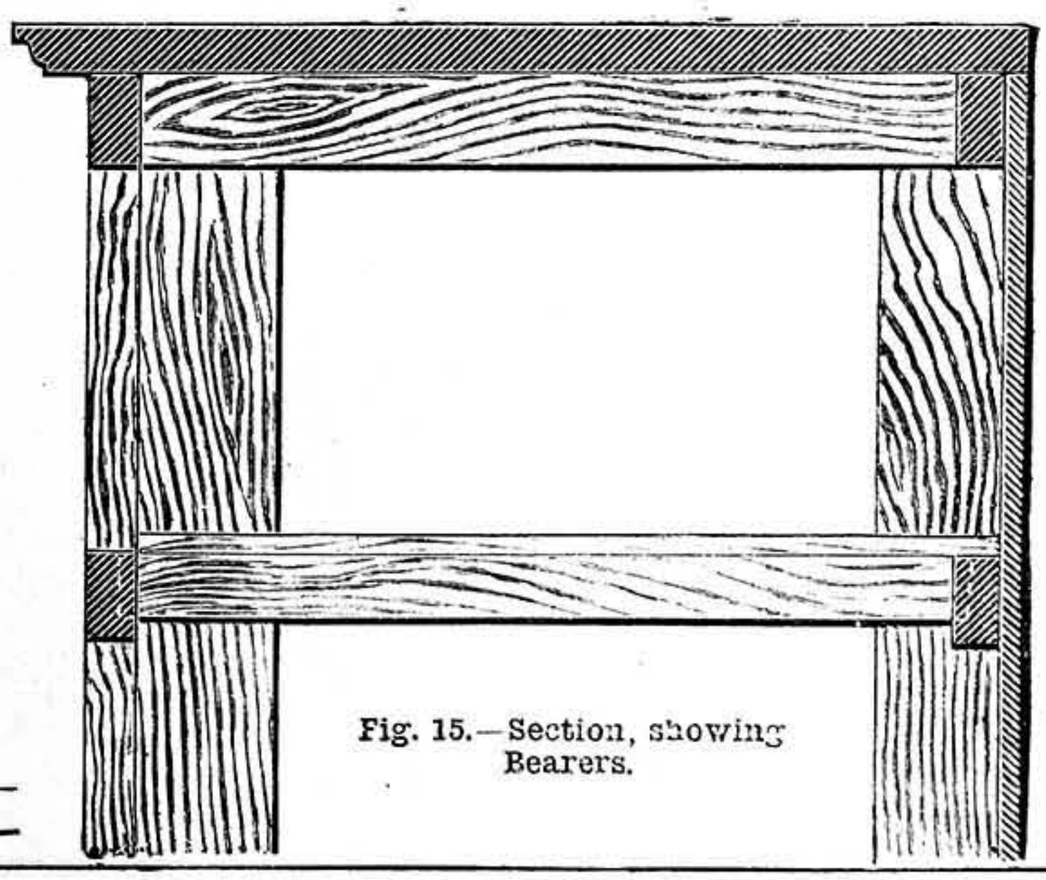

Fig. 15.—Section, showing Bearers.

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up the stone in those parts, first preparing it with the acetic acid as previously alluded to. The artist must be sure to go over the same lines as those already drawn, and this requires a very neat piece of work to avoid making double lines, as he must bear in mind that the drawing is the reverse way to the original sketch being now on the stone.

Any writings or tracings when done on paper should be made, if anything, rather thinner than required, as they may spread slightly in the transferring.

To proceed to the subject of drawing on the stone itself, a tracing of the subject must be made on the ordinary, or végétal, tracing paper, according to the clearness of the sketch; then gum the top corners of the tracing to the stone, taking care to reverse it, slip a piece of the red transfer paper underneath, with the red face to the stone, and go over the tracing carefully with the tracer, lifting it up now and again to see if it is going down satisfactorily. If the drawing is to be worked in chalk, the red line should be made as faint as possible, for although the liquid ink would penetrate through the chalk, it may prevent the lithographic chalk from adhering properly to the stone. If the outline should be too strong, a little talc brushed lightly over the stone will remove some of the red chalk without destroying the tracing. Should the tracing require any alterations, it can be washed off the stone with a clean sponge and water; but the stone must be allowed to thoroughly dry before re-tracing and proceeding with the work.

Some artists use a looking-glass to work with, but it is not advisable to make a practice of doing so, as it is not then easy to do without it, and there is really no difficulty in getting into the habit of working the reverse way to the original sketch.

In ink work the student must not think because the drawing appears nicely shaded on the stone that it will necessarily print so; perhaps the ink is a little thinner in those parts where it appears lighter or browner in colour, which will help to give the illusion, but it will all print equally black wherever the ink has touched the stone, therefore any tinting or shading required must be worked in lines or dots. The best teacher is the student's own experience, which he can obtain in an easy manner by working in various ways on a stone and then having it printed.

Black-and-white drawings on polished stones are generally shaded or tinted in lines in imitation of etchings, stipple being reserved for colour work; and whether the drawing be done in stipple or chalk, the outline and markings should be all made first before any tinting is begun, and in the case of ruling that should be done first of all. If any large space for solid is required, it is better first to outline it with the brush, then make the drawing, and fill in the solid last.

To etch the drawing after the work is completed, the stone must be placed flat on the bench, and the brush filled with the etch passed lightly once over the drawing, leaving it as evenly as possible on the stone, taking more as required (being careful not to leave a line showing where the etch is renewed), and the drawing must not in any way be rubbed, which refers especially to chalk work.

Should there be a quantity of solid on the stone, the work does not require the acid as strong as if there be a great deal of strong tinting and very little solid; and also light tinting does not require such a strong etch, but it is impossible to lay down any decided rule for this.

In very particular chalk work it is better not to touch the drawing with the acid brush at all, but to slightly tilt the stone and pour the etch over it, allowing it to run down; and there are special troughs made with fixtures on which to place the stones, and which can be moved to tilt them in any direction; but in any case the etch should be put on as evenly as possible, and allowed to dry before sending the stone to the printer, when he again etches it. Some printers prefer to etch the stone entirely themselves, but it is better that the artist should do this first etching himself, as it is the most important, and he knows exactly how the drawing has been worked, and can therefore judge the necessary strength the etch should be better than the printer; besides which, he is sure the work is not rubbed in any way when it leaves his hands, which might otherwise be the case.

It is a very dangerous practice to cover stones with paper before the gum is dry, as it would stick, and when the printer washes it off it would not be his fault if some of the work were rubbed at the same time. Some artists are very careless in leaving their stones to be etched until the last minute; for good chalk work the stones should be under etch about twelve hours, but stipple does not require so long. In fact, for some commercial work it is better to etch the stone, and almost immediately afterwards roll it up.

If the drawing were over-etched—that is, having used the acid too strong—the work would disappear in the printing, the acid eating through the ink, especially in fine work; and if not etched sufficiently would not print clearly. But after trying once or twice, the student will soon find out the desired strength it should be.

In lithographing printed letters such as Fig. 23 (page 231), the student can only be advised to do them carefully as he would do on paper, and to use his own judgment whether to gum out the letters and fill in the stone solid, or rule round the letters and fill in the spaces, leaving the letters open, it being possible to do them either way, if the letters are required to be left white upon a coloured ground. If the letters are coloured it must be just *vice versâ*, the letters filled in solid, and the spaces left, but when spaces are gummed out the ink should be dissolved in turpentine instead of water, to prevent it mixing with the gum, otherwise parts that are not required would perhaps roll up black.

A very effective monochrome drawing can be done by printing it in two colours—namely, a drawing stone, and a tint. Do the drawing as if it were only to be done in black and white, and have it printed either in red, sepia, grey, or black, according to taste and the nature of the sketch; then have an offset taken from this just the same as if it were a tracing, using the drawing-stone as if it were a key-stone, and fill in this second stone solid, excepting the high lights (the red impression on the stone from the original drawing will show where the high lights would come), and if a grained stone be used, the solid can be shaded off or left sharp as required. If the drawing is printed in a dark sepia, and the tint in a very pale shade of the same colour, the white paper being left for the high lights, a very pretty effect can be obtained from the one drawing.

In the case of small cards, or drawings, it is possible to do several on the same stone, only they must be placed in proper positions to allow for cutting and trimming them to the size required.

I took for our last subject, as an example, a chromo-lithograph in half a dozen printings, namely, gold, yellow, blue, pink, brown, and grey, showing the working of each colour, and at the same time making it applicable to any drawing in any number of printings. As I went into the matter as fully as space would permit, I need not say much on the subject in addition to the supplementary remarks I have felt called upon to make in this my concluding paper on the method of lithographing circulars and letters.

It seems to be a general idea that chromo-lithographic drawings are worked on the stone in colour, but this is a very great mistake, and gives an entirely false notion to anyone unacquainted with the work; for to refer back to the first principles of lithography, every colour is worked on the stone with the lithographic ink, which is black, and after the stone has been etched, the ink being of no further use, is washed off, and the required printing ink rolled on the stone whilst it is damp, it being necessary to do this for each impression taken; and as the printing ink adheres to the preserved portion of the stone, it does not make the slightest difference whether it is black or coloured. The following is a good and useful order for printing: gold, silver or bronzes, yellows, blues, pinks, reds, browns, light greys, dark blues (if any), dark reds, and dark greys.

Some artists begin with all the light colours, and gradually work down to the strong ones, but I should advise the artist, from practical experience, to get a strong colour on the proof at an early a stage as possible, as it will throw all the other colours back to their proper places, and so do away with the necessity of using extra colours, or re-proving the whole thing again.

WIRE-WORK IN ALL ITS BRANCHES.

BY JAMES SCOTT.

Dog Muzzles and Gas Globes.

DOG MUZZLES—NOSE WIRE—CHEEK WIRE—NOSE RINGS—DROP WIRE—GAS GLOBES, FIRST STAGE, SECOND STAGE, FINAL STAGE.

Dog Muzzles.—What the present canine generation really think about the manner in which their noble heads are encased within cages provocative of tantalization, I, and everyone else, I believe, will be unable to determine, unless transmigration of souls is a truth (which I doubt), and at some time or another is closely connected to spiritualistic revelation, when, perchance—but let this drop; it is but an exceedingly improbable theory.

The dogs themselves, however, do not appear, generally, to take any more notice of the metallic obstructions to their complete happiness than they would of a pimple—both are encumbrances which certainly annoy them, but which they accept in good spirit. Pinch a dog; pull his tail; and the treatment is different. He will not endure it. But as muzzles exist, I will for a time be the dogs' unwilling foe by letting out a few remarks as to how these guards are made to prevent them from nibbling their benefactors and from kissing each other.

There are so many different patterns of muzzles that it would be well-nigh impossible to describe them all without wearying the reader by giving him several pages of particulars; and as I am limited to space in proportion to the several articles I have

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undertaken to write upon, I must confine myself to the unit one in dealing with them.

In passing, I might mention that there are several patented muzzles, during the wearing of which dogs are permitted to eat and drink at will, without there being a possibility of their biting anyone. It is obvious that, did opportunity offer, a description of either of these would be of but little use, as in such a case the patentees would be very suspicious that some readers might avail themselves, without permission, of the manufacture of such. It may be what is generally vulgarly termed a "come-down" from patent muzzles to the very common pattern shown in Fig. 111, but this is the article I propose to deal with.

The dog for whom the instrument of torture is intended would be the best judge as to the sizes required; but, unfortunately, these animals cannot make their desires known to us; therefore it is necessary for the choice to be left to our humane judgment. A reference to Fig. 111 will show that I have lettered the wires represented. These wires, where shown separately in other diagrams, are similarly lettered to secure identity.

Nose Wire.—To the bench, or to loose boards for the purpose, are driven a number of short iron pegs, in the manner shown in Figs. 112 and 113. Those in the former diagram are used for forming the nose or crown wire, while the pegs, supposed to be in Fig. 113, are those around which the side or cheek wire is bent. A straight wire, with an eye-hole of the shape indicated, is hooked to peg F (Fig. 112), while the wire is carried in and out among the other pegs, as represented in that diagram. Continual practice will be expedient to accustom the operator to properly bend the wires, as, although it is easy enough to guide them properly around the different pegs, it will be noticed that, upon release from them, they will spring out considerably.

Cheek Wire.—In Fig. 113 is represented the cheek wire in plan. An eye-hole is formed at one end and hooked on to either extreme peg, from which it is continued, in the manner shown, on the outer sides of the first two pegs, on the inner side of the fourth, outside the fifth and sixth, and so on, finishing up at the other end in an eye-hole. If more than one muzzle is to be made of the same size, follow the hints I give for ascertaining the proper straight lengths of wire necessary in my remarks on the formation of hooks in the paper concerning fire-guards.

Nose Rings.—When the nose and cheek wires are ready, solder them together at their junction. Three oval-shaped rings are then required, a small one for the front of the nose, a larger one for the middle, and one still larger for the back. They will be soldered in position outside the nose and cheek wires, with their eye-holes undermost. Each of these ring wires will be formed round an oval block or ring fixed to the bench. An eye-hole will be formed, hooked to a peg at the head of the block, and the wire drawn round it, and the end passed through the first hole and squeezed down tightly over it (Fig. 115).

Drop Wire.—As most people may know,

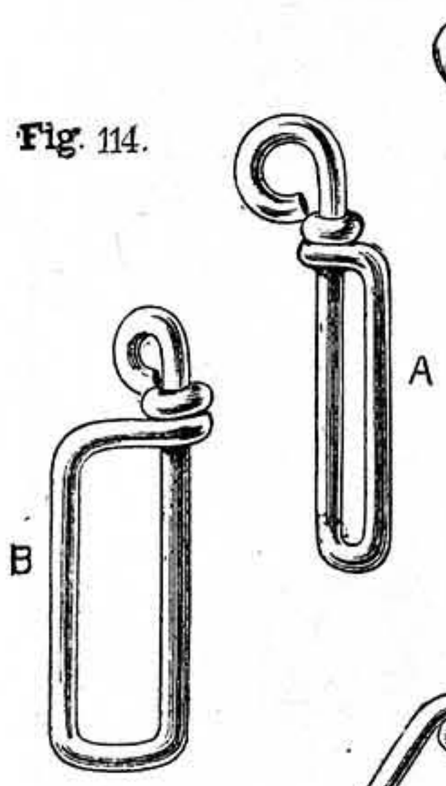

Fig. 114.

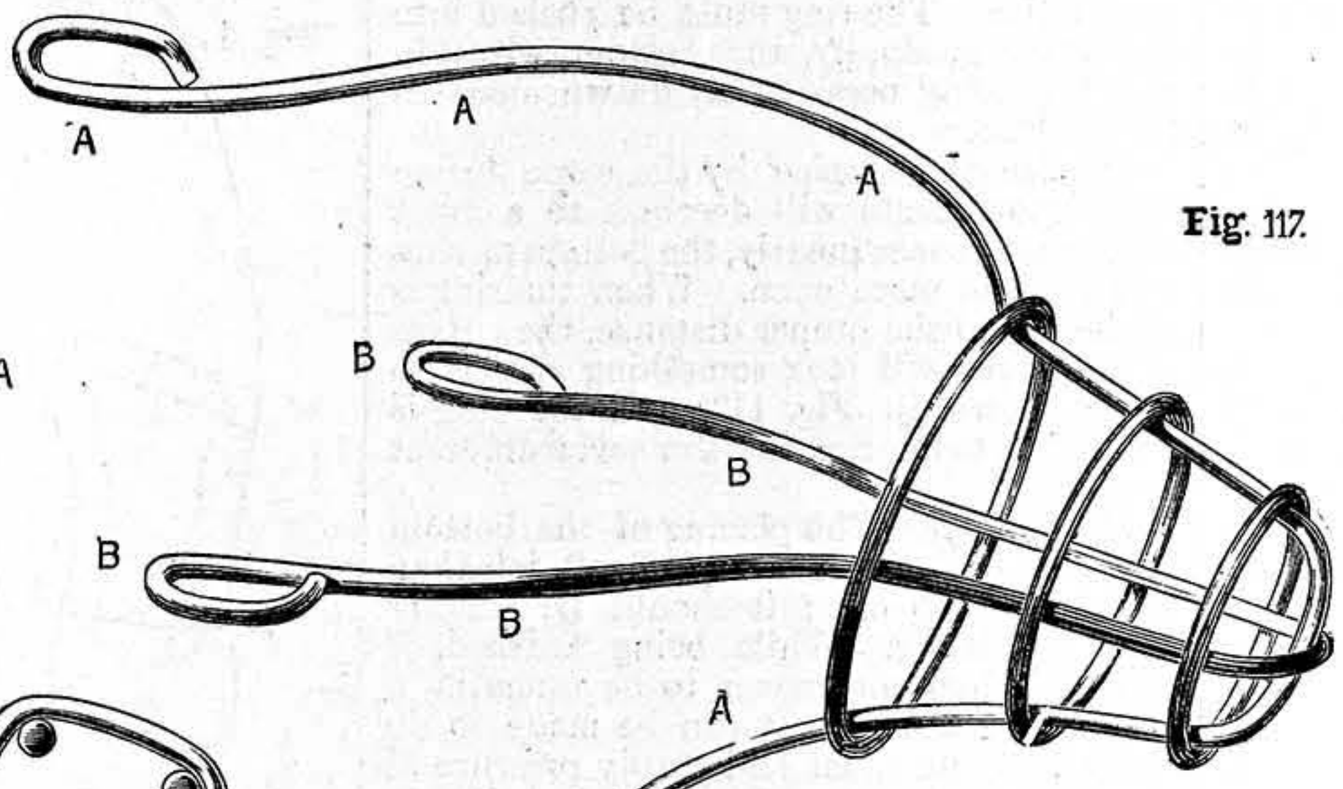

Fig. 111.

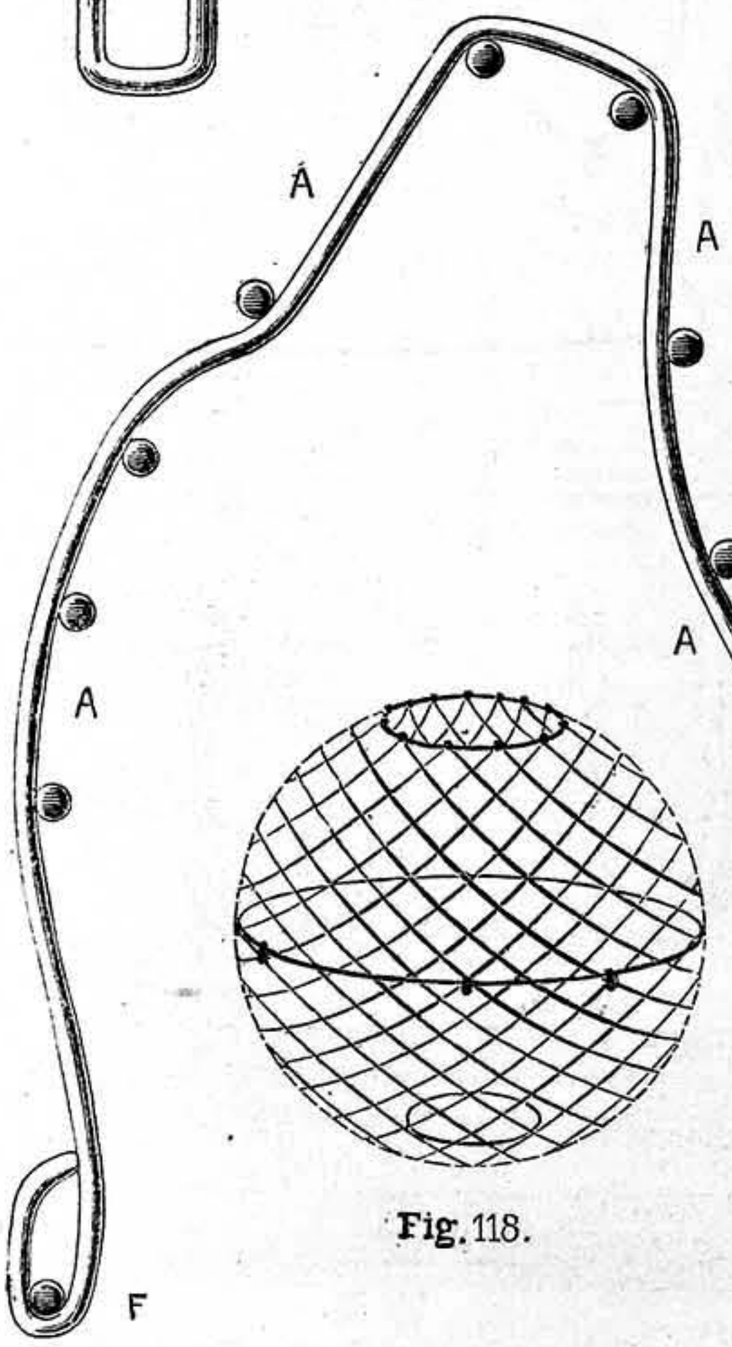

Fig. 112.

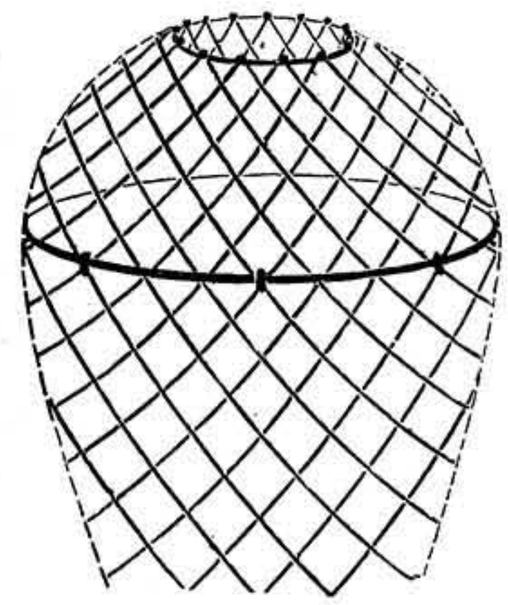

Fig. 117.

Fig. 118.

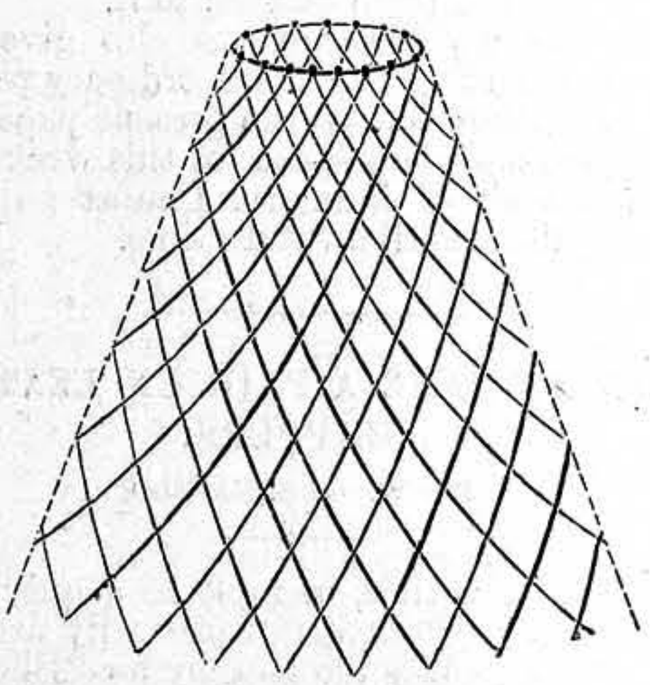

Fig. 116.

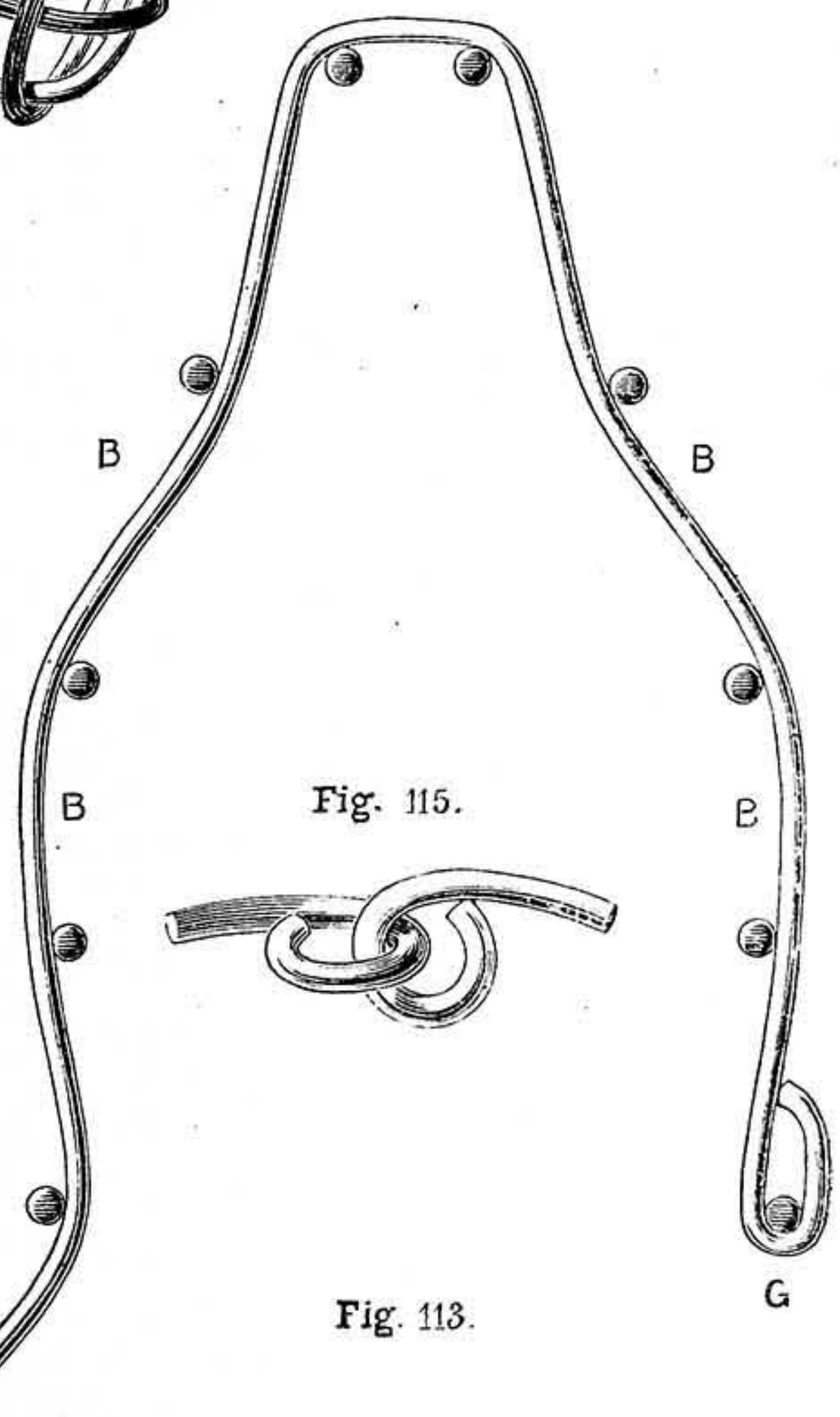

Fig. 115.

Fig. 113.

Fig. 111.—Common Pattern of Dog Muzzle. Fig. 112.—Nose or Crown Wire laid upon Bench and bent around Pegs. The Wire is hitched on to Peg F, and bent in due order outside and within the remainder as shown. Fig. 113.—Cheek Wire laid upon Bench and bent around Pegs. The Wire is hitched to Peg G, and treated in same manner as shown in Fig. 112. Fig. 114.—Two Views (A and B) of Eyes for Strap. Fig. 115.—Eye-holes to complete Nose Rings. These Holes are at the bottom of the Rings, and must be squeezed closer than shown here. Fig. 116.—Gas Globe of Crimped Wire: First Stage. Fig. 117.—Ditto, Second Stage. Fig. 118.—Ditto, Third Stage.

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there is a drop eye-wire underneath the muzzle, attached loosely to the lower eye-hole. It is shown in Fig. 114, on the right-hand side of which is a side view of it, while on the left is shown a front view. It is such a difficult matter to illustrate portions of wire-work in an understandable manner, that I have shown this hook, or rather two of them, as hanging upon a block. Solid articles, such as furniture, can be made clear by variations of light and shade; but with such open work as I am labouring with at present, it is impossible to obtain many degrees of light and shade. In Fig. 114 the main portion of the hook is supposed to be exposed in full before the reader, while the top eye-hole is receding from him. On the left-hand side the reader may imagine that he sees the main portion edgeways, projecting from the paper, while the eye-hole is flat and full before him.

This hook is for the reception of the strap, which also travels through the remaining eye-holes in the nose and cheek wires. Fig. 114 is drawn to a much larger scale than the diagrams, Figs. 111, 112, and 113.

I wish to whisper a hint into the ears of my amateur friends who possess dogs, as to how they may obtain the proper shape to make a muzzle to fit their particular canine companion. Come in, take a seat, while I ask your jealous professional brethren to wait outside, lest they condemn me for assisting you. First, catch your dog. Next, coax or compel him to stand close up against a wall, while a shadow of his head is cast sideways upon the latter by the rays of a lamp close by. Then pencil along the outline of the shadow of the head, if the dog will allow you to, after which he may be released. Measure the dog's head from the nose to between the ears, and also the sketch from the nose to the ear. If they coincide, well and good; if not, reduce proportionately the sketch within the original outline until satisfaction results.

You may then, to arrive at the length the nose wire must be, place a piece of string against and completely along the outline, having just so much as will cover it entirely. If a piece of paper or card be hung to receive the shadow, the outline upon it can be used as a guide for the necessary pegs around which to bend the nose wire.

Gas Globes.—I will now pass from articles devised to prevent our four-footed friends and foes from giving us sundry bites, to articles invented to debar a more serviceable friend and more dangerous foe, viz., fire, from annoying us.

The utility of gas globes must be evident to all. They secure gas jets from the approach of pieces of paper, etc., that may happen occasionally to be blown about an apartment, curtains from being forced into direct contact with the same, and in numerous directions affect good by guarding the flame and debarring it from being the means of creating damage by setting fire to inflammable material.

First Stage.—I must refer my readers to my article upon "Splicing" (No. 123, page 292). There they will observe that I show a cylindrical piece of work, which is obtained by a certain number of straight crimped wires put together, and then bodily bent round and spliced. It is from such a piece of work, but consisting of many more wires, that these globes are made. A comparatively small ring is put *outside* the top end of the work, the wires at that part being drawn close together, and those which the ring comes in contact with turned over on to the latter. There will be a considerable decrease in the size of the meshes adjacent to this ring when it is fitted, the work having a tendency to assume an appearance similar to that of Fig. 116. In order to secure the ring in position whilst the wires are being permanently fixed to it, it is advisable to, at first, turn over one here and there, say, in about four different spots.

Second Stage.—The next operation is the fixing of a large ring, which ring will be placed *within* the wires composing the globe. This will be found a more difficult part to accomplish. The ring must be pushed into the work gradually, the bottom wires in Fig. 116 being occasionally drawn apart as this is done.

The length occupied by the work during these movements will decrease to a great extent, and, consequently, the bottom meshes will become more open. When the ring is pushed in to the proper distance, the curves of the wires will look something similar to those shown in Fig. 117, and the ring is secured by being tied in six or seven different spots.

Final Stage.—The placing of the bottom ring will be found a more difficult job than fixing the top one; it should be smaller than the latter. While being finished, if the work does not appear to be assuming a truly globular shape, it can be made to do so by bringing equal and steady pressure to bear upon it, one opening of it being in direct contact with the bench. If all is properly done, the globe will look like Fig. 118.

While fixing the bottom ring, *outside* the wires, gradually gather the loose ends together with both hands, until they can be easily grasped in one hand only; then slip the ring on, and temporarily secure it by fastening a wire here and there, previous to turning all of them over on to it.

It was my intention to also give particulars here of the more ordinary pattern of gas globes, but as the present paper has occupied sufficient space for this week upon this branch of industry, I must postpone descriptions until a future time.

HOW TO MAKE A PAIR OF LEATHER SLIPPERS.

BY W. GREENFIELD.

THIS brief article, in reply to a query put by NOVICE (*Stockport*), necessarily assumes this form, as it is too lengthy for "Shop."

I have come to the conclusion that you want the most simple way of making a pair of slippers. Your *nom de plume*, and asking what tools you need, tell me you are not far advanced in the trade, but I wish you had told me what you wanted to make them—pumps (single sole) or welts (double sole), or if you only want to make them riveted or pegged, which is often done for rough wear.

Had I but known which, I should have answered before, but as it is, I have waited till I had time to tell you the way to make a proper pair of slippers. You can, in this style, make them light or stout, according to the substance of the tops, and as they are leather they are worth a good sole. Of course, I conclude your tops are already cut and closed, as you only say make.

This class of slipper is easily repaired, and is by far the best way to make them; that is certainly why I have decided upon them, as I feel sure that a number of readers will welcome the answer to your question, and it will form a good stepping-stone to boot making.

Of course, you have lasts that fit you; if not, you must get a pair.

A shoemaker's necessary kit for what you ask is as under:—Knife, pincers, hammer, sharpening-strop, sewing-awl and handle, lap-iron, piece of smooth board, rasp, buff-knife, and fore-part iron. Bottom stuff and grindery:—Pair of in-soles, pair of out-soles, pair of welts, pair of stiffeners, pair of split

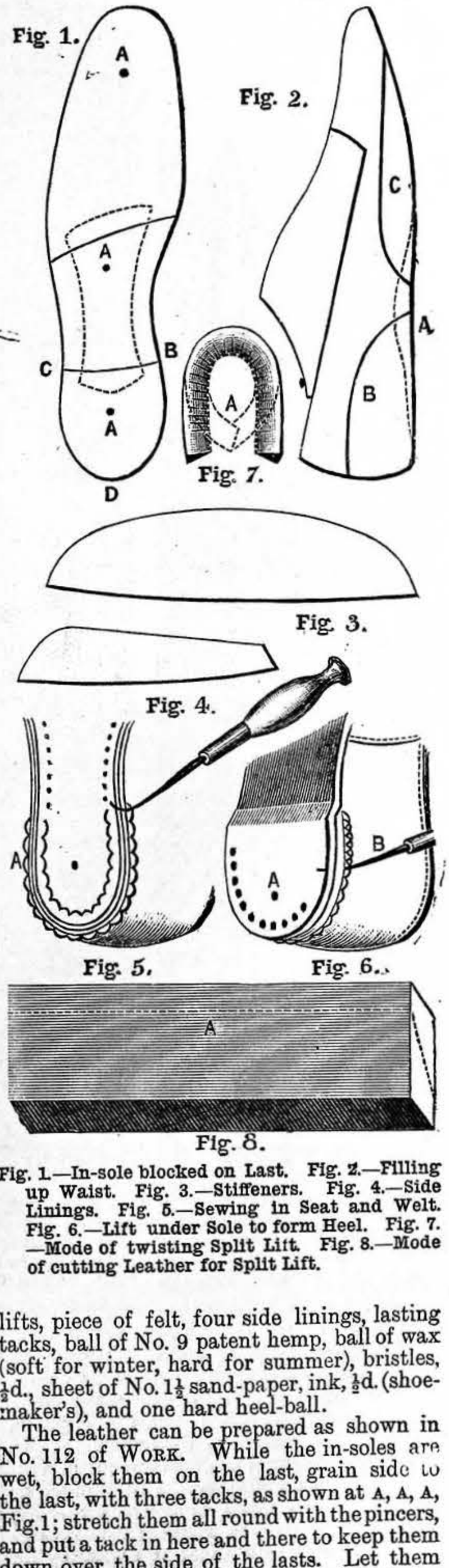

Fig. 1.—In-sole blocked on Last. Fig. 2.—Filling up Waist. Fig. 3.—Stiffeners. Fig. 4.—Side Linings. Fig. 5.—Sewing in Seat and Welt. Fig. 6.—Lift under Sole to form Heel. Fig. 7.—Mode of twisting Split Lift. Fig. 8.—Mode of cutting Leather for Split Lift.

lifts, piece of felt, four side linings, lasting tacks, ball of No. 9 patent hemp, ball of wax (soft for winter, hard for summer), bristles, ½d., sheet of No. 1½ sand-paper, ink, ½d. (shoemaker's), and one hard heel-ball.

The leather can be prepared as shown in No. 112 of WORK. While the in-soles are wet, block them on the last, grain side to the last, with three tacks, as shown at A, A, A, Fig. 1; stretch them all round with the pincers, and put a tack in here and there to keep them down over the side of the lasts. Let them get nearly dry, draw out the side tacks, and round up to the shape of the last. A

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slipper last should be dead in the waist, and it ought to be thin at the top. These two points are to make them fit tight in the quarters; but if the last is a boot last, then the waist must be filled up by putting a piece of stout soft belly inner-soling in to fill it up and make it almost straight at the bottom, as the plain line, A, Fig. 2; the dotted line, B, showing the curve or drop there generally is in a boot last.

And now I must refer you to back numbers of WORK, otherwise I should have to encroach too much on our space.

The next thing to do is to fit and hole the in-sole, and by referring to Vol. II., page 796, No. 101, you will find all this fully explained in the answer to A. B.

Next comes the fitting the welt. This you will find in the answer to H. G. (Vol. II., page 733, No. 97).

The stiffeners are the shape of Fig. 3, only they are about 9 in. long and 2 in. wide; they are skived a little at the bottom, and round the top they are skived to *nil*. Their place in the slipper is shown by B, Fig. 2, and they are put in between the upper and lining.

The side linings are skived in a similar way. They are the shape of Fig. 4, and one is put in at each side, as shown at C, Fig. 2.

Next comes the principles of lasting, and these you will find fully explained in the answer to Snobby (Vol. II., page 717, No. 96), with one exception—slippers must not be pulled over tight in the waist, or it will tend to make them loose in the quarters.

And now you must be referred to the last article on "Boot and Shoe Repairing," which appeared, as you may remember, in No. 137, and is on "Welting and Soling Hand-sewn Work." From this you will see the way to sew your welt, only it will have to be sewn in from B, up the waist and round the toe to C on the other side (Fig. 1), and after you have sewn to C, sew your seat round from this point to B, passing D; or the seat can be sewn in first and then the welt, as A, Fig. 5. Then you put a shank in—that is, a piece of leather in the waist, as shown by the dotted line—or the whole can be filled up, as the bottom of the fore-part, with felt, as will be seen in the above-named article, which also tells you how to put and stitch the sole on; and in this case the waist can be sewn, as for a slipper it is hardly necessary to stitch it.

For slippers, a heel need not be built, as it is for a boot, but the sole left long at the back, and this can form the heel-piece. Of course, it wants to be thicker here to form the heel, and this is done by putting a whole lift and a split lift under the sole at A, Fig. 6. A split lift, or rather a pair, is a strip of thinnish sole leather, about $6\frac{1}{2}$ in. long, and about $\frac{3}{4}$ in. or 1 in. wide. This is well wetted and split down the centre, holding it flat on the board and knife quite slanting, and follow the dotted line as shown in Fig. 8. Each piece is held flat on the lap-iron and twisted round, letting the thin edge from the centre (as A, Figs. 7 and 8) hold it together at the ends, as shown by the dotted lines in Fig. 7; and while held in that position, with the left hand keep tapping it gently with a hammer in the centre; this will make the wrinkles lay flat, which the thin edge will form itself into. It is sure to spring back a little, if only in drying, and it will then be its proper shape, as Fig. 7. The ends will want tapering, and the front of the whole lift as well, and then they can be put under the sole and a nail driven in at A, Fig. 6, to hold them in position. The heel can then be trimmed up, as shown in the answer to M. M. (Vol. II., page 568, No. 87).

The way to cut and lay down the channel you will see in the article I have spoken of above on "Soling," etc.

The way to sew down the heel is shown in B, Fig. 6, and how it is done is told as above in Vol. II., page 568, No. 87. And the way to finish, set up stitch, iron, etc. etc., good enough for the purpose you ask (or, any way, for your first three or four pair), you will find by searching the pages spoken of above.

To make the heels wear longer, a few nails can be put in the back, as shown in Fig. 6.

I know I have given you a lot of searching, but my experience was gained by searching for detail, and, if you can but see it, there are many more awkward corners turned in some of the above answers than I could tell you in any straightforward article, unless it was very long.

HINTS ON NETTING.

BY LANCELOT L. HASLOPE.

THIS short paper was suggested by and is in reply to a query by J. H. (*West Bromwich*), as to the *modus operandi* of netting, and the tools required. For illustrations of the netting needle, mesh, mode of making stitch, etc., the reader is referred to Vol. II., page 425, otherwise No. 79.

The tools required for making nets are very simple. They consist of a needle to hold the twine or other material used, and a spool or mesh to form the loops of the net upon. They are usually made of some kind of hard wood, generally box, and can be purchased from most ironmongers and woolshops for a few pence. If J. H. could get a sight of them, he would doubtless be able to make them for himself of the exact size he requires.

The knot used in netting is the weaver's knot, or sheet bend, shown in page 65 of WORK, No. 109. There are two methods of making it used by netters. The most common way is called "under edge" netting. This is easy enough when you know how to do it, but it is complicated and quite impossible to describe without the aid of elaborate illustrations. The other mode is called "over edge netting," or "braiding." As this is much simpler, I will do my best to describe it. The first thing to do is to make the "foundation." A piece of small cord or stout twine, about a yard long, is joined together at the ends with a sailor's knot and then fastened to the handle of a door or other suitable place. If the net to be made is small, the left foot may be put in the loop. The needle having been filled with twine, one end of the twine is made fast to the foundation. The spool is held in the hollow between the forefinger and thumb of the left hand, the fingers being extended along it, as a pen is held in the right hand. To form the first stitch the twine is brought over the spool, then under it, over the foundation, and up over its own part—thus forming a clove-hitch. The hitch thus formed is now held between the tip of the forefinger and the thumb of the left hand, while the needle is passed over the foundation again and up through the loop formed; the two loops are pushed close up together and hauled taut. This is repeated again and again until as many half meshes or loops are formed as are required. When this is accomplished, turn the foundation over and slip the loops off the spool; pass the needle over the spool, round under it, and bring it up through the first loop on the foundation; draw this down until the end of it just touches the upper edge of the spool; hold it there with the forefinger and thumb of the left hand. Throw the loose twine well over to the left side of the loop that has just been taken up, and pass the needle behind the loop and bring it up in front of the spool, and haul taut. The knot is now made. Pass the needle over the spool round it and up through the next loop, round the back of it, and between it and the last loop, and when hauled taut another mesh will be formed. Care must be taken to have sufficient slack twine, so that the needle has plenty of room to work easily. In every case the stitch must be made *on* the loop taken up, and not below it, or a "slip stitch" will be formed which is fatal to good netting. Braiding has some advantages over "under edge" netting. In the first place, it can be done with greater rapidity; it also makes rather a better stitch—at all events, one that can be tautened more easily. If any difficulty is experienced in making the first row of half meshes, the spool may be dispensed with, and the loops made with the fingers of the left hand alone. In mending nets, the fingers alone are generally used in the place of a spool.

SHORT LESSONS IN WOOD-WORKING FOR AMATEURS.

BY B. A. BAXTER.

INTRODUCTION—OBJECT IN VIEW AND LIST OF TOOLS NEEDED—DESIRABLE ADDITIONS.

THESE lessons, compiled from some years' experience, are written in response to a widely expressed wish for a column in WORK which should be devoted weekly to teaching carpentry in a progressive and practical manner. It is thoroughly impossible, however, to promise that the lessons shall be "continued in our next," and it is difficult to compress a lesson into a column, but something shall be attempted. This brief introduction is written to clear the ground and to explain several matters which the papers may not have made clear to a typical pupil.

Our object is to advise a beginner, who, without experience, needs guidance, to avoid errors and mistakes into which he is apt to fall. It is presumed that the learner will know the names of a few of the more general tools, and the more special tools and adjuncts will be explained as they are required.

First, a bench. There are many now in the market that are good and suitable; do not get one that is too low, and let the sort of work you intend to favour have an influence in your choice. The smaller benches sold at the tool-shops are not high enough for an adult—from 33 to 34 in. for a man is excellent, 26 to 30 in. for boys.

In a review of a book on "Slojd" (Vol. III., page 330), the Editor recommends benches made with screw at the end as an excellent addition to the bench. I quite agree with him, and advise all who can do so to obtain a bench so fitted.

The tools necessary are dependent upon many considerations, but those which follow may be regarded as indispensable:—

Planes: A jack-plane, 17 in. long; a smoothing-plane; both $2\frac{1}{4}$ in. iron.

Saws: A hand saw, 26 in. long; a panel saw, smaller teeth, ditto; a "carcase" dovetail saw, 10 in. or 12 in.; a bow or frame saw, 12 in. blade.

Chisels: A set of eight, "firmers" and

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assorted. For mortise chisels, obtain $\frac{5}{16}$ and $\frac{7}{16}$ in. sash chisels.

Gouges: Three or four, chosen to taste, $\frac{3}{8}$ in. upwards.

Gauges: Two marking and two cutting and one mortise gauges; a 2 ft. rule, one $4\frac{1}{2}$ in. square, one 9 in. or 12 in. square; hammer, mallet, a few bradawls, one pair of dividers, a bevel, two screwdrivers, two punches, an oil-stone, oil-stone slip, and oil-can; for fixing work, two or three hand-screws and glue-pot; if hard wood is to be worked, a scraper and a toothing-plane. If funds are still in hand, buy an iron stock or brace, and a selection of boring bits, a spokeshave for curved work, a spirit-level, and pair of pincers. When the use of a jack-plane is acquired, and freedom can be combined with definite stroke, well under the operator's control, a trying plane may be purchased, but it is useless without this preliminary practice.

There are several accessories which may and ought to be made by the amateur, such as bench hook, mitre cut, shooting board, etc. Explanations of all these have been given in WORK, and the index may be consulted to great advantage. In our first lesson we shall consider the plane.

SQUARE AND OBLONG VESSELS IN SHEET METAL.

BY R. ALEXANDER.

SQUARE AND OBLONG-SHAPED ARTICLES—HOW TO MARK OUT AND MAKE UP—EXAMPLES—SQUARE VESSELS WITH UPRIGHT SIDES—DITTO WITH SLOPING SIDES—YORKSHIRE PUDDING PANS, DOUBLE BAKING PANS, BREAD TINS, AND SIMILAR ARTICLES.

A FEW simple examples of square and oblong work will now be given. To make a rectangular vessel with upright sides and of given dimensions, sides and bottom in one piece (Fig. 1), let the size of the vessel be, for example, 8 in. by 5 in. by 2 in. In this case add twice the depth of one side to the length and also to the width; this gives the size of the piece of stuff to cut it out of. I am supposing this to be a plain tin pan without wire or fold. Thus the size in this case will be 12 in. by 9 in. Mark out a square of that size on the metal, A B C D, Fig. 2. With compasses set at the depth required, place one point at the corners successively and mark the eight points × and draw lines through them parallel to the outside lines; this will be the line to fold the sides up from. If the sides are to be simply soldered up, the corner pieces of the pattern must be cut out; if it is to be lapped round at the ends, leave pieces as shown by the dotted lines. If the pan is to be wired, allow as much extra as will be required for the size wire to be used, parallel to the outside edges (see dotted lines). It will be found that wiring makes the article larger in its outside dimensions, though not in its capacity—by twice the thickness of the wire and of the tin that covers it. Thus, in the example just given, instead of the vessel being 8 in. by 5 in., it would be $8\frac{1}{4}$ in. by $5\frac{1}{4}$ in. So if an article of this description is to be made of a given dimension *outside* the wire, the bottom must be marked as much smaller all round as the thickness of the wire to be used, and a trifle more even, to allow for the thickness of the tin. When the article is to be larger at the top than at the bottom, it is cut out like Fig. 3, which we will suppose to be a pattern for an article the same size at the bottom and same depth of sides, but 1 in. larger each way at the top. After marking the corners out square as in the previous example, set the compasses to half the size larger required at the top, and from the points A, A, B, B, C, C, and D, D, mark off points E, E, F, F, G, G, H, H; draw lines from these points to the corners × and you have the required pattern. Oil tanks for paraffin stoves are made like this, only then the part we have been calling the bottom would be the top, and the bottom would be soldered in at the large part.

Yorkshire Pudding Pans (Fig. 5).—The pattern for these and the method of marking out is shown at Fig. 4, which is a full-size pattern of a corner; for stock sizes they are usually cut full out of the stuff (after squaring up), single, middle, and double, and are turned up from $1\frac{1}{2}$ in. to $1\frac{3}{4}$ in. (before wiring). It is marked out in a similar way to Fig. 1, but after marking the points, which give the difference in size between the top and the bottom, a line is marked for cutting the notch to allow for wiring; this notch is cut down rather deeper than twice the diameter of the wire to be used. The dotted line, A B, shows the idea. The compasses are then placed at the corners with radius × A, and the arc A C described. The portion F is then cut away; the other corners are, of course, treated the same. In working up, great care must be taken with the corners to get them true. I will try to describe the way to do it. Press the corners over the tip of the extinguisher stake and bend on the line E ×; this will commence the corners and slightly turn up the side. The bending of the sides can then be continued on the hatchet stake; or, if that is too wide, on the side of the anvil or end of crease iron, assisted by the mallet. When the sides are up sufficiently the corners are knocked together, A and C meeting, and bent round on the ends of the article, against which they should lay quite close and flat; the sides are then finished. The dishes can next be folded for wiring on the hatchet, wired and jennied, which completes them, as they require no solder when turned up in this way.

There is a tool called a dripping-pan swage, which will turn up the sides; it can be set to various depths, and is very useful for piece-work. Whilst on the subject of baking pans or dishes, a word or two on making dishes to order may not be out of place. In these there is usually a given size, and it is generally the length and width of the top and the depth; it is very seldom that the dimensions at bottom are given, that is left to the judgment of the workman. I have already shown how these dimensions may be regulated, and would draw attention again to the fact that allowance must be made for the wire, or the dish would be larger than the dimensions given. Always err a little on the safe side; thus, if a dish is ordered 12 in. by 10 in., try and work to get it $\frac{1}{8}$ in. under each way, there can then be no dispute about its being too large to go in the oven, and the slight difference in the measurement is of no practical importance in a case like this. A frequently occurring order is a double baking dish (Fig. 6). The bottom dish is a plain dish to contain water only; the inner dish that contains the meat has a well, strainer, and filling corner. The outer dish is made with more upright sides than would be the case if it were a single dish, and also somewhat deeper; 3 in. deep is a usual size for dishes of over 12 in. square. The inner pan must be cut about $\frac{3}{4}$ in. smaller each way, as it will not want to be so deep; but it must be the same distance along the sides after the notches are cut. Fig. 7 illustrates what I mean; if this is carefully attended to, the dishes, when turned up and wired, will fit each other nicely. With regard to the well, it can be hollowed in either before turning up or after; for myself, I prefer to put it in after wiring. A circle should be described in one corner so that its circumference comes about $\frac{1}{2}$ in. from each side of the dish. (See Fig. 8.) To hollow up the well, I wire a strong piece of tin with a small wire (about No. 13) and turn it round and seam it together, making a neat join of the seam at the wire, and also solder round the wire, then solder this on to a piece of tin about 1 in. larger all round; punch two or three small holes in this, and tack it to the bench with some tin tacks; place the dish over this, and work gently all over the circle described for the well, commencing in the centre. This is a much better way than hollowing on the block. Of course, care must be exercised in hollowing not to push it too far, or the stuff would split and spoil the dish. A strainer should be put in the corner where the well is, so that the gravy can be strained as it is poured out of the dish. Fig. 9 shows this. It will be seen that the angle of it is greater than a right angle; this is so, that when it is fitted to the corner of the dish, the front of it will be raised above the level of the dish. Close in the opposite corner of the bottom of the inner dish a $\frac{1}{2}$ in. hole must be punched and a plain piece of tin soldered and riveted across this corner marked A. Fig. 6 is for pouring water into the outer dish, so the reader will see that the piece of tin which covers the hole must be quite sound or the water would get into the inner dish. A pair of handles is affixed to each dish, and as this kind of handle is frequently required for many other purposes, I will briefly describe how to make it.

Fig. 10 shows a very handy tool for bending the wire into the shape required. A piece of wire of the required length is placed between the two pairs of rollers as shown in the figure; the handles, H, H, being pulled apart, the wheels at their extremity travel round the semi-circles and bend the wire into the shape shown at F. This is a most useful tool where a quantity of such things are wanted. Failing this tool, they can be bent on the extinguisher stake or in the vice by means of an improvised tool consisting of a piece of $\frac{1}{2}$ in. or $\frac{5}{8}$ in. round iron bent into the shape of a U. (See Fig. 11.) A strip of tin of sufficient width is then passed through the handles and bent over the join in the wire (which is rather a bull considering that there is no join, so let us say where the wire meets); it is then laid on the edge of a tool and knocked close, the wire sunk all to one side.

Fig. 12, A, B, C, shows these details. The handles of the outer dish are fixed on the outside, and those of the inner dish on the inside; two rivets must be put through each; a pair of wire runners are generally, though not always, fixed to the outer pan to prevent the bottom wearing out through drawing in and out of the oven. The meat-stands for these dishes are usually kept in stock; if not, the smith makes them. If I had no smith, and could not get a stand, I should make one myself.

Square Articles with the Sides and Bottoms in Separate Pieces.—Example, bread tins (Fig. 13). To mark out the end pattern, set out a line, A B, Fig. 14, and draw another line parallel to it at a distance

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equal to the depth required, and draw E F perpendicular to them from E on line A B. Set off on each side of the perpendicular line a distance equal to half the size required at the bottom of the tin × × and on line C D. From the point F set off each side half the size required at top of tin, Y Y. Join Y × on each side of the perpendicular line and you have the pattern perfectly true and correct. The pattern for the side, Fig. 15, is drawn in exactly the same way. Allowance for seam-wiring and edge for bottom should be added on to the pattern after marking what I will term the net size. I have marked it on the side pattern, Fig. 15, by dotted lines. The end pattern will require the same allowance as the sides for wire and bottom edge; but at the sides only half as much. The reason for this is that as the sides are knocked round on to the ends, there is a double turn on the side portion, thus requiring a large notch. Of course, if the ends were to be knocked on to the sides, the side pattern would have the small notch and the ends the large one. This kind of article is very easy to make. After cutting out, place all the pieces, sides and end, with notches all one way, at the folding machine. Fold the sides first, about the same size as for a saucepan, and seam and fold them right close up, both folds one way. (See section line of fold, Fig. 19, A.) Next fold the ends, but instead of folding close as in the case of the sides, fold just over a right angle. (See section line, Fig. 19, B.) After folding thus, fold for wiring. The ends must be put into the machine with the fold *uppermost*, and the sides with the fold downwards, or they will not come right when put together. If you are very sure that your cutting out is absolutely true, the edge for the bottoms can also be folded in the machine; but it will be best at starting to throw off the edge after they are put together and wired. The way to do this is to put them together in halves first—that is, take a side and end, and slipping the side into the end, and keeping it in position with

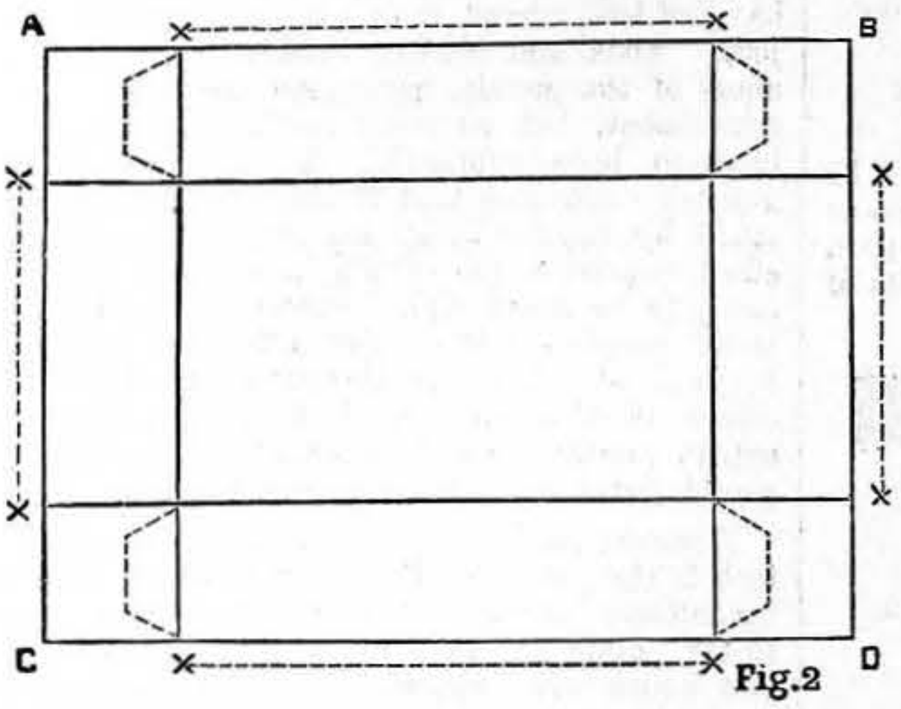


Fig. 2

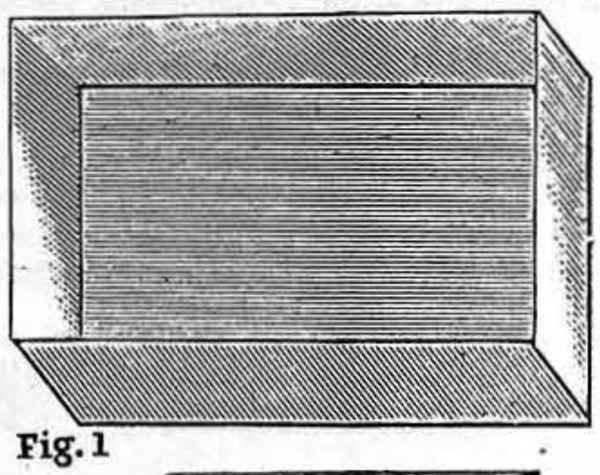
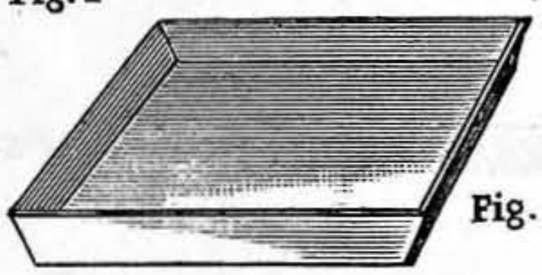


Fig. 1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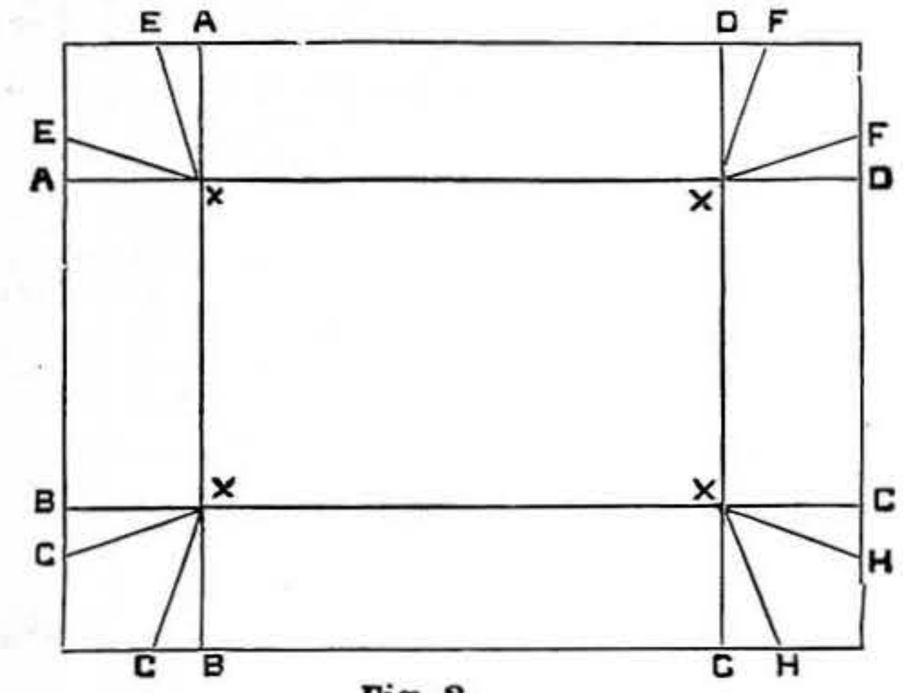


Fig. 3.

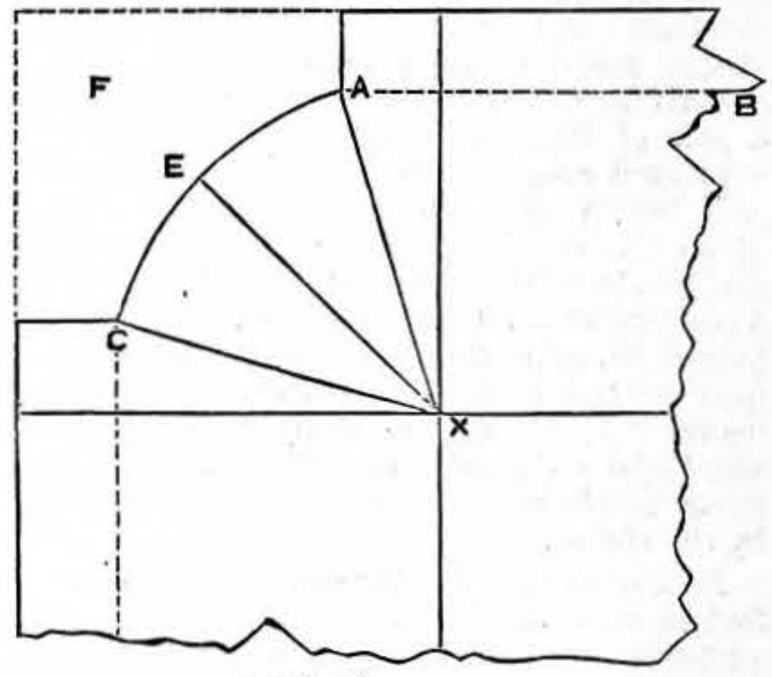


Fig. 4.

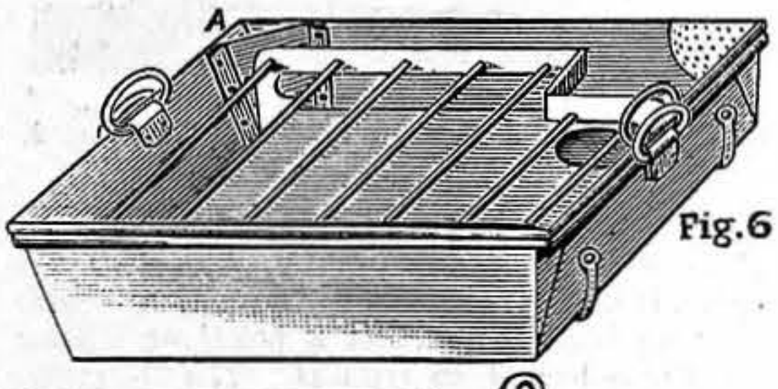
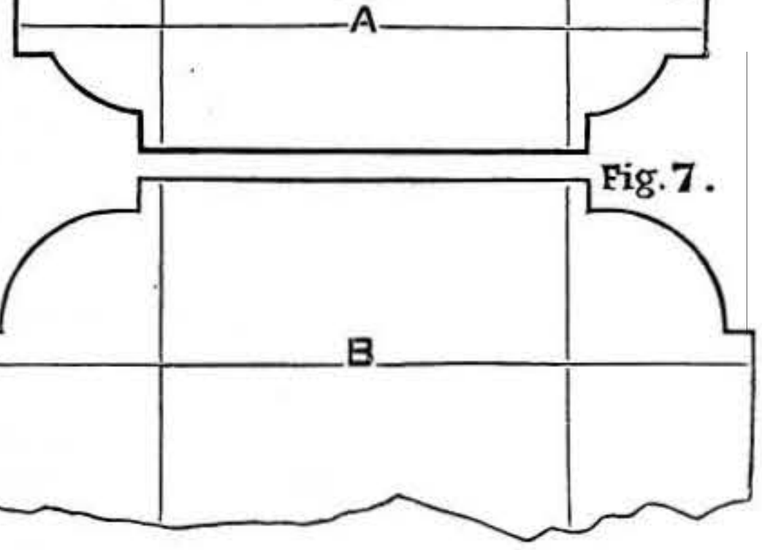


Fig. 6



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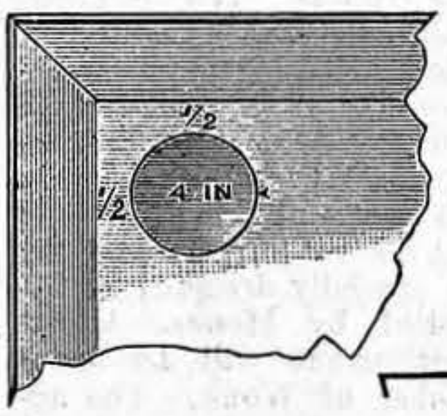

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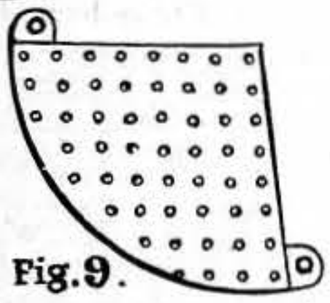
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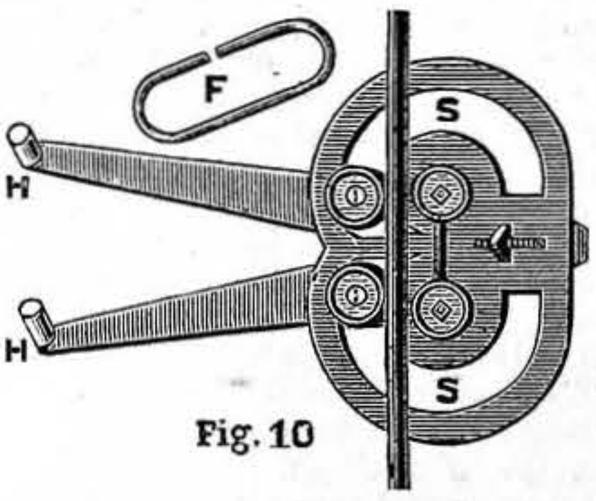
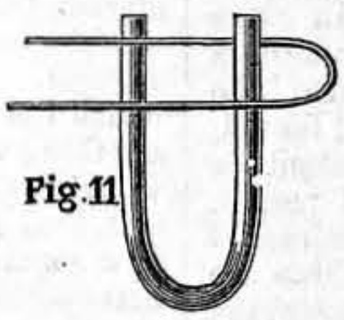


Fig. 10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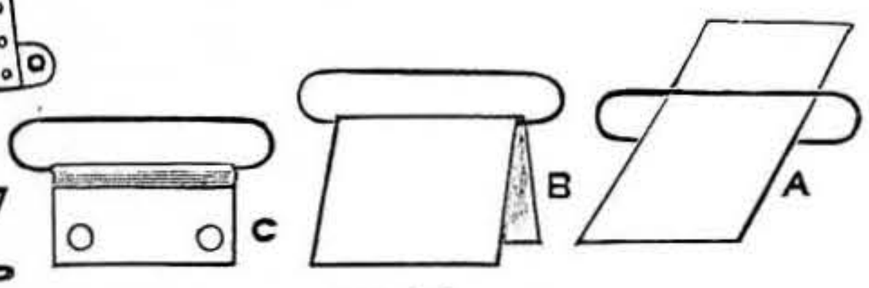

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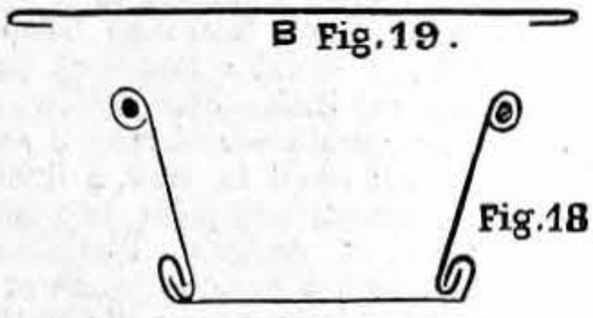
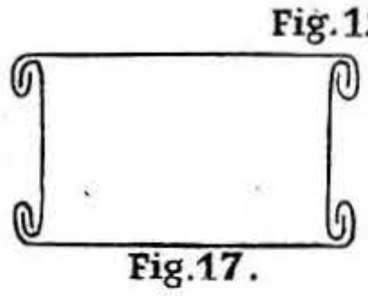


Fig. 19.

Fig. 18.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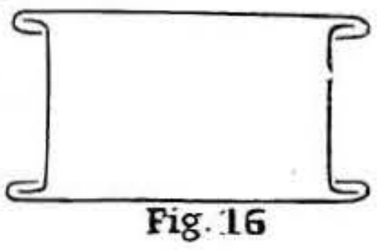
Fig. 16

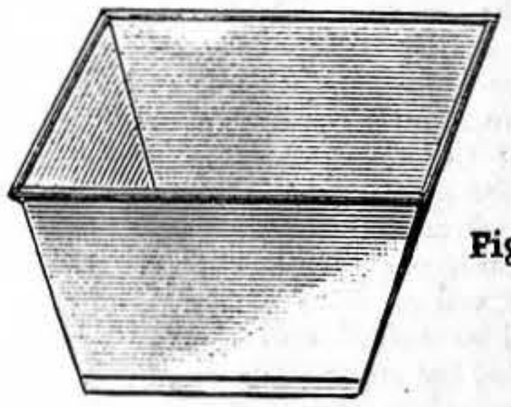
Fig. 13.

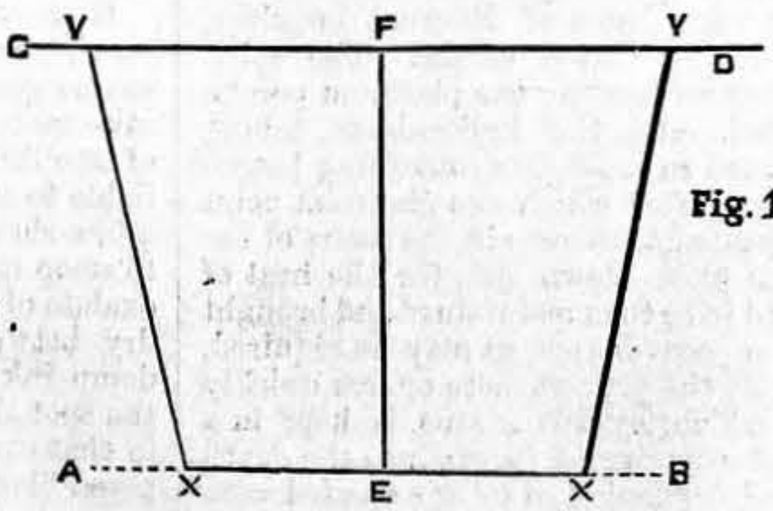

Fig. 14.

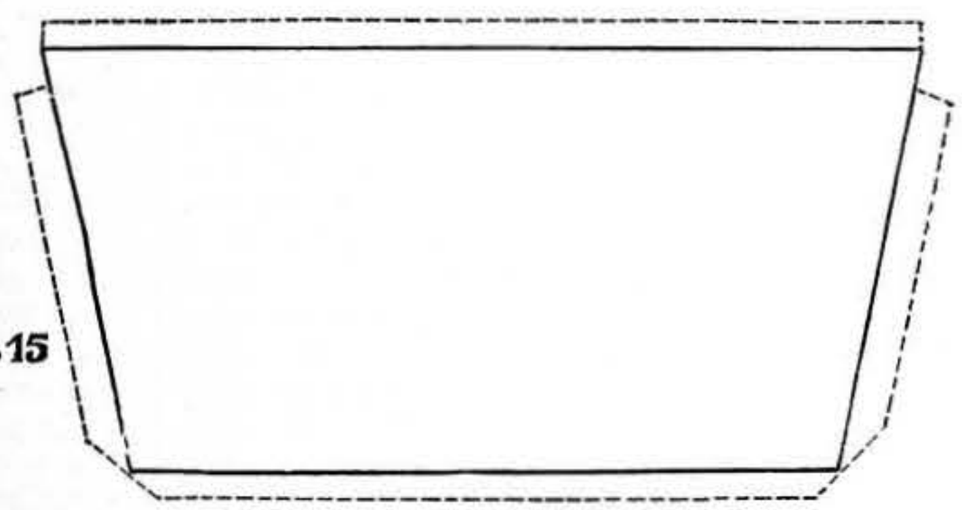
Fig. 15

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the forefinger, pane them together; use a bick-iron for this; then knock this seam down on the end. It will be found that this leaves rather a rounding edge. To square this up, hold the seam edgeways on the bick-iron and go along the rounding edge with a square-faced hammer; do them all like this, and then put the halves together in the same way.

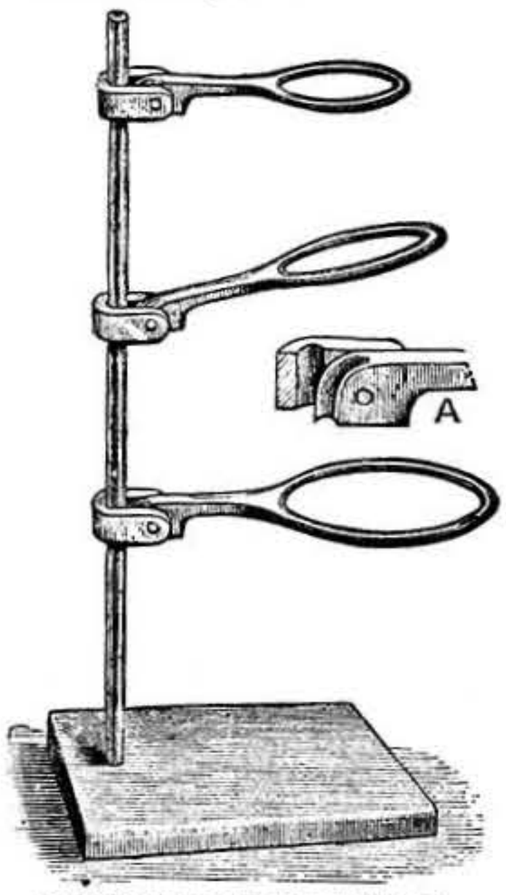
Figs. 16 and 17 are cross-sections of the tin, showing seams paned and "knocked up." Next wire them and edge for bottoms, cut bottoms with sufficient allowance for turn up, notch all four corners off, turn up on the hatchet, and pane and knock up as usual. Square the knocking up with the hammer in a similar manner to that described above. Fig. 18 is a section showing seaming of bottom.

OUR GUIDE TO GOOD THINGS.

*** *Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of* WORK *for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of anyone who has a useful article for sale to obtain mention of it in this department of* WORK *without charge, the notices given partake in no way of the nature of advertisements.*

83.—Moor's Self-locking Retort Stand.

The Self-locking Retort Stand shown in the accompanying illustration is the invention of Mr. C. G. Moor, B.A., who has produced other useful appliances for chemical and other work, among which may be named his Chromic Acid Battery, a cheap and powerful battery for laboratory work, his "Simplex" Gas Generator, and his new Mouth Blowpipe, well adapted for the purposes of analysts, dentists, jewellers, etc. The form and construction of this new pattern retort stand will be easily understood from the annexed illustration; and the enlarged view of the locking portion of the apparatus at A, in which the portion of the slide nearest the spectator is removed in order to show how the inner end of the arm which holds the ring acts against the rod on which it slides so as to render it immovable in the position in which it is placed until there is occasion to alter it. Thus it will be readily understood that the ring can be adjusted to any height required in a moment by raising the ring slightly, and then sliding it up or down as required. When the ring is pressed down the arm and ring will automatically lock and remain perfectly steady. It is claimed by the inventor that this retort stand possesses the following advantages over the ordinary form: (1) When hot, the rings are easily moved by lifting them with the end of a file or other similar iron tool. (2) In the old form, if made of brass, the thread of the screw is apt to wear out and slide; whereas, if the set-screw is made of iron, the acid vapours of the laboratory will soon rust the thread, and make it difficult or impossible to use. The rings in this Self-locking Retort Stand are made of cast iron, and carefully annealed by a new process: this renders them very strong, and as they are of considerable thickness, no fear of burning away the metal need be entertained, as a Bunsen flame may be directed on them for any length of time without the slightest detrimental effect. The sole manufacturer is Mr. James J. Hicks, but I presume they may be obtained of or through any dealer in druggists' sundries.



Self-locking Retort Stand.

84.—The "Vulcan" for Pyrography or Poker Work.

What is popularly known—or it would be better to say what *was* popularly known—as "poker work," was a rough semblance to a landscape or portrait by exposing the surface of

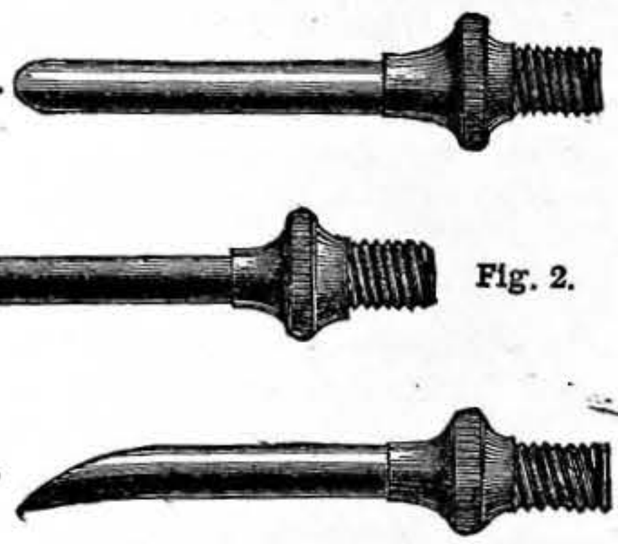


Fig. 1.—Blunt Tool used in Poker Work. Fig. 2. —Sharp Tool. Fig. 3.—Horn Tool.

a piece of wood, jointed and prepared for the purpose, if on a large scale, to the action of heat emanating from the end of a poker or similar piece of iron heated to redness. The drawings, if they may be so called, were very coarse and rough in appearance, but of late years far more pleasing and attractive decorative effects have been obtained by the use of tools which are far lighter and more convenient to handle than the cumbrous poker, which it was always difficult to keep at the proper heat for the purpose in view. These tools have been specially designed for the work, and are supplied by Messrs. Abbott Brothers, whose advertisement will be found elsewhere in this number of Work. The apparatus is supplied complete in a box, and consists of a stoppered benzoline bottle, an extra store bottle, a metal attachment or union, a spirit lamp, an indiarubber bellows with tube attached, an extra piece of tube, a small funnel, a metal pencil cased in cork, a light pencil for ladies' use, a platinum point, two small panels, and a sheet of designs. Platinum points of different forms are supplied, some of which are shown in the accompanying illustration, and are adapted for tracing lines of different breadths, and thus producing varied effects. The spirit lamp, to be used for heating the platinum points, is first lighted, and the indiarubber tubing properly adjusted to the bottle containing benzoline and bellows, after which the platinum point to be used is heated to redness in the flame of the lamp, which is then blown out, for the heat of the point is said to be then maintained and brought to a greater or less degree, as may be required, by blowing with the bellows more or less quickly on the point, which, by this means, is kept in a proper state of adjustment to produce the depth of tint required. The design to be executed with the platinum point should first be traced on the wood with the pencil before the hot point is used. After a little practice there is no doubt that the work can be easily and quickly executed, and that pleasing effects can be produced. Most of the white wood fancy articles now so much in request can be artistically decorated by pyrography. With the apparatus—which consisted of the articles above-mentioned, complete in a neat box—Messrs. Abbott Brothers submitted for inspection a stand for a small drum clock or watch, worked in a pattern with the hot point, which presented a variety of rich tints combining, with the dark lines of the pattern itself, to produce an article that would be highly appreciated at bazaars, etc.

The Editor.

SUGGESTIONS FOR WORKERS AND HINTS TO INVENTORS.

Commercial Electrolysis. — Electricity is beginning to play so important a part in many processes for the commercial production of various articles, that a large number of inventors have, of late, turned their attention to the subject. Soda and similar products, as well as many of the metals, have been the subjects of experiment, but no very marked success has hitherto been achieved. As, however, it is generally admitted that a large fortune may be made by anyone lucky enough to discover an effective process, the efforts in question are not likely to be abandoned. Unfortunately, a good many people devote their attention to such subjects who have no thorough knowledge of either chemical or electrical matters, and an expert qualified to write a work upon the subject would find it a profitable undertaking.

Mechanical Voting.—One does not generally look to the pages of *Truth* for hints as to new inventions, but "exceptions prove the rule." Its editor points out in a recent issue that ninety-two hours were wasted last session in Parliament in the mechanical business of taking divisions, and suggests that some inventive genius might devise a more expeditious means of arriving at the desired end. Except by fitting a pair of electrical pushes—"Aye" and "No"—to each member's seat, we do not, however, well see in what way mechanical aid could be given. It might perhaps be possible to devise a dial-pointer which the voter could place in such a position as to record his vote on a current being passed through the entire series, an indicator near the Speaker's chair showing a total of so many "Ayes" and so many "Noes." There should be no great difficulty in devising something in this way if it was likely to be adopted by the House.

Phonographic Advertising.—The man who first of all avails himself of the phonograph to advertise his wares will, in all probability, distance all competitors—at all events, for a time. The novelty of substituting the ear for the eye would undoubtedly "catch on." A machine which continuously reminded the passer-by that he "ought to buy Smith's soap" would attract the most careless attention. Still more would a combination of eye and ear be likely to succeed. A life-sized face, from the lips of which the sentence could be heard, would beat anything yet in the field. The chief disadvantage would probably be that it would be too popular, and that crowds might assemble to watch the new departure to so embarrassing an extent as to necessitate police interference.

Removing Ink Blots.—An easy way of removing a disfiguring blot upon paper is not by any means generally known. The knife and rubber ink-eraser are usually resorted to, with the result of spoiling the surface of the paper. People liable to such accidents will find it useful to take a few sheets of thick white blotting-paper, and to steep them three or four times in a solution of oxalate of potassium or oxalic acid, letting them dry between each steeping. This applied to a damp ink spot will at once remove it. If dry, the spot should be wetted, and allowed to remain in that condition for some little time. The prepared blotter will then, as a rule, remove it; but in cases where the ink has been allowed to dry into the fibre of the paper, success cannot be guaranteed. With a fresh blot, however, it is always successful.

Drilling Glass or Porcelain.—Amongst things not generally known is the fact that, when it is desired to drill glass or porcelain, it is well to touch the place of the hole with hydrofluoric acid before applying the drill. This roughens the surface, and allows the point to "bite." Many people, also, are not aware that the glaze of porcelain is the substance that presents the hardest surface, and that when this has been penetrated, the boring proceeds easily enough. A hole should never be drilled right through from one side only. Directly the point of the

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drill shows, the tool should be applied to the tiny orifice, and the hole cut clean in this way. Paraffin oil is a good substance for aiding progress. If the hole is too small, it is better to ream it out with a piece of tapering. four-sided steel than to use a larger drill.

SHOP:

A Corner for Those who Want to Talk It.

*** *In consequence of the great pressure upon the "Shop" columns of* WORK, *contributors are requested to be brief and concise in all future questions and replies.*

In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of WORK *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters from Correspondents.

A Simple Cramp.—J. W. writes:—"Seeing in a recent number of WORK that one of the readers had been asking for a contrivance for holding the joints of mitred frames, I thought the following simple cramp might be useful to some of the amateur readers who do not care to go to the expense of buying a proper cramp:—Plane a piece of deal, 2 in. by 8 in. by 1 in., up true, and two pieces about 1 in. long by 2 in. by $\frac{5}{8}$ in.; screw these on the large piece at an angle of 45° with the long sides, so that they form a right angle with each other, but leaving the inside corner about 5 in. apart, as shown by A and A', Fig. 1, which is drawn to scale, as shown below. Now plane a piece of $\frac{5}{8}$ in. stuff up, of the shape shown at B, Fig. 1, and screw it in place as shown. Now cut two wedges out of $\frac{3}{4}$ in. hard wood, 9 in. long, and about 3 in. wide at the broad end, with a notch cut in as shown at Fig. 2. These

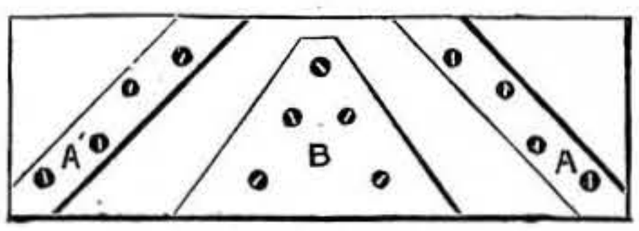


Fig. 1.

Fig. 2

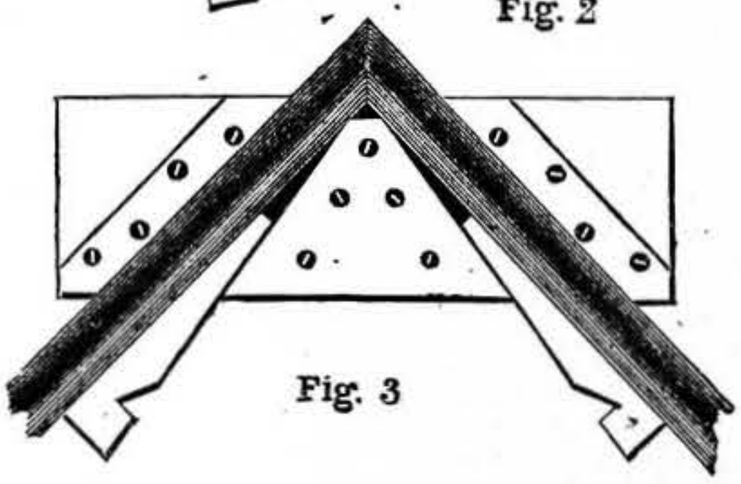


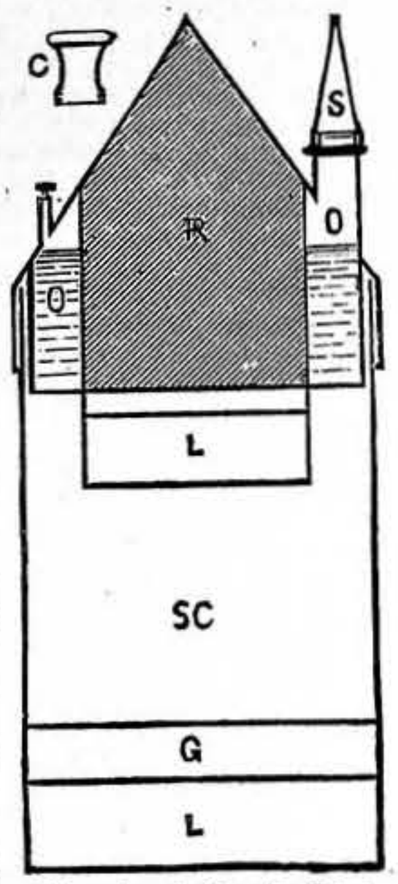
Fig. 3

A Simple Cramp. For Explanation of Figs., see accompanying description.

are cut out of thin stuff to allow them to slip under the front edge into the rebate. The way of using it is shown in Fig. 3: one side should be fastened in place first, then glue the joint and place the other side in position, driving the wedges in quite tight. The joint may now be fastened by running a sawgait in and gluing a piece of veneer in, or by screwing with fine screws. Now knock the wedges out, and treat the other corners in the same way. This will be found to be a very handy method, and a good deal less cumbrous than the one given in answer to the above reader, which will be found on page 229, No. 123. One man that I know well, who has made some dozens of frames of all sorts, never uses anything else. Another thing that I may say is that he always uses fine screws. Brads do not answer very well, as the wedges want driving so tight, it is apt to injure the frame if it is at all delicate."

"Robinson" Air Engine.—E. E. P. (*Tufnell Park*) writes:—"I notice a reply to a query respecting a motive power for organ-blowing in WORK No. 132, page 446, column 1. The 'Robinson' air engine is particularly suitable for this work, being inexpensive, and costing but a trifle to work. Messrs. Morris & Henty are making these engines."

Plumber's Resin Box.—READER OF "WORK" writes:—"I have drawn a plan for a combination plumber's resin box, which I have found very handy. It contains oil (O), resin (R), place for screws (SC), etc., and grease (G) in the bottom. I did not know if it would be of use to anyone else. The oil runs round the resin box; the resin box and oil are in one. The resin box has a lid (L) at the bottom; the spout (S) unscrews when not wanted, and the cap (C) screws on. Put the spout in with the screws. At the bottom I have parted it off about 1 in. and put on a lid (L) for grease; this is full size, and made of tin."



Plumber's Resin Box.

Pocket Accumulator.—E. R. D. (*Sherborne*) writes, in reference to reply to S. G. V. (*Boro'*) under this heading in page 443, that he "should see the portable lamp illustrated in a recent number of the *English Mechanic*. If preferred, the lamp can be made to take off, and used at a distance from the accumulator."

II.—Questions Answered by Editor and Staff.

Clock Cleaning.—J. A. (*Inverness*).—Any watchmaker would be able to let you have one or two second-hand movements—lever would be best, or heavy Genève—as when buying the cases the works are usually taken out; this would be the cheapest way to go to work. Failing to get what you want like that, apply to J. Crewe, 100, Aldersgate Street, London, E.C., or W. Cardall, Ombersley Road, Droitwich, who keep good movements; but, of course, you would have to pay much more for them. If not able to find what you want, write to any watch tool shop and try them.—A. B. C.

Wheels for Wire-crimping Machine.—W. G. (*Glasgow*).—For the required set of cog-wheels, the firm most likely to suit you is the Phosphor Bronze Company, Ltd., 87, Sumner Street, Southwark, London, S.E. It seems that you must tender a pattern or patterns in wood (or wax, from which wooden ones will be made) from which to cast the wheels. You must obtain the assistance of some friendly wire-worker who owns a machine. I advise you to write to the above company, alluding to this reply, when, doubtless, you will receive due and courteous attention.—J. S.

Squeaking of Bearing.—A. McD. (*Glasgow*).—If the bearing is properly cleaned out and oiled, there will be no squeaking sound there. Perhaps it is some other part of the machine that gives forth the squeaking sound. If after cleaning out the bearing with paraffin, and oiling up properly, the sound is still heard, look for it somewhere else than in that wheel. Perhaps the rim touches some part of the frame at every revolution, or perhaps the pedal nut touches the chain or a stay rod.—A. S. P.

Cups for Bicycle Bearings.—J. B. (*Clapham*).—Cups for bearings are usually case-hardened before putting into their places. But as the process is both tedious and expensive, another method of hardening may be followed. Have the cups fitted in the hub-ends, then take them out. To harden them, get prussiate of potash, pound it down to a powder, and heat the cup to a red, not white, heat; sprinkle the powder all round the hollow in the cup, where the balls run; the powder will fizzle for a minute or so, then reheat the cup to a dull red, and plunge into cold water. The acid will have penetrated the metal, not through, but of a sufficient depth to make a very hard surface for the balls. The size of balls will depend entirely on the size of cups. For pedals, $\frac{1}{16}$ in. balls; for wheels, $\frac{1}{4}$ in.; for bottom brackets, $\frac{5}{16}$ in.—A. S. P.

Price's Lathe with Vertical Slide.—G. H. (*St. Helens*).—R. Price's address is now 125, Stratford Road, West Ham, E. The lathes will do turning, boring, milling, slotting, shaping, and wheel-cutting. Ordinary lathes will do all these, but the vertical slide gives especial facilities for milling, boring, shaping, and wheel-cutting. For milling and boring with the bar, the vertical slide is so convenient that it is a wonder those who have no milling machine can be content to do without it. It is not pleasant to do much wood-turning on a lathe intended for metal, but if you wish to do this, you might fix up wooden bars so as to continue the bed three or four feet and take the poppet and hand rest, but *not* the slide rest, which you don't want for turning wood; it would only be in the way. Mr. Price says he has made one with a gap, so I suppose you can have one if you wish. I think the watch lathe mandrel would not "jamb," but drive rather hard in drilling if made as you propose.—F. A. M.

Taper Hole in Mandrel.—OLIVER ASKING MORE.—The taper of hole in mandrel used by Britannia Co. is 1 to 9; Milnes used formerly 1 to 12, but now he has adopted the Morse taper, and I think you had better do the same. You can't get the right taper by setting the slide-rest by the quadrant, that method is not sufficiently exact. I advise you to buy a little American drill chuck (sure to be useful) fitted on a Morse taper plug of the proper size to fit inside your mandrel nose; then bore the hole with a drill to the size of the small end of the taper plug, fix a sharp tool in the slide-rest, and, setting the cutting point at exactly the height of centres, gradually turn out the nose till the plug fits and your little drill chuck runs true. You must rub a little red marking on the plug and squeeze it into the hole; notice where the red is rubbed off, and adjust the slide-rest accordingly; the last cut should be taken with a very sharp tool and a fine feed.—F. A. M.

Fitting Fly-wheel.—OLIVER ASKING MORE.—If the hole in your fly-wheel is $\frac{1}{8}$ in. larger than the shaft on which it is to fit, I should either bore out the hole $\frac{1}{8}$ in. larger, or turn down the seating on the shaft $\frac{1}{8}$ in. smaller, so that there might be a space of $\frac{1}{8}$ in. all round between the two; then get a piece of steam-pipe, bore it out to fit on the shaft, drive it on a mandrel, and turn the outside till it fits into the wheel; now take a hack-saw and cut right through one side of this piece of pipe. Now, if you have a keyway in your wheel, you will file a flat on the pipe at 90 deg. (or one $\frac{1}{4}$ round) from the slit, so that the key can collapse the pipe on shaft; if there is a set-screw in the wheel, it will bear on the flat on the pipe and compress it in a similar way. F. A. M.

Gauges.—A. F. should write to Messrs. Sharp, Stewart & Co., Glasgow.—F. C.

Motion.—A. U. S. (*Birmingham*).—Your design will work very well with a few additions. The lower roller should have a light recovery spring. To maintain continuous motion you will require a fly-wheel on the axis of disc. If you will send particulars of the purpose to which you propose to apply this motion, I will give you full instruction in the matter.—F. C.

Spindle.—A WORKING MAN.—Any local smith can supply you with the spring and spindle. I should think 2s. for the spring, and 1s. for the spindle would be enough.—J.

Coach Painting.—C. C. (*Milford*).—In the first place you want a paint-mill to grind your colours fine; such colours as Prussian blue, Dutch pink, Vandyke brown are as hard as stones. After being crushed up with a hammer they can be ground quite fine in a hand paint-mill, the cost of which will be 30s., and I am sure that you will never regret buying one. But such colours as ultramarine, green, or vermilion and brown, which you mention in your letter, should cause you no trouble in grinding fine upon a slab with the muller, as these colours are generally sold in the powder and not in little lumps as the above-mentioned hard ones. After grinding the colour upon the stone you had better let it run through a sieve or muslin. I fear that it is not the paint which is gritty, there are other things besides, such as having the room perfectly clean, using clean and separate brushes, no draughts to create a dust, etc. As you have not mentioned what it is you are wishing to paint, I will just merely show you how to mix and lay the colour on. In painting with ultramarine it is usual to give a preparation coat of Prussian blue, but as a substitute, and which will do equally as well, get some ultramarine and a little drop black and grind in gold-size and turps; get this on the panels as soon as possible, as it soon sets, and will show brush marks, besides going thick in the pot. In painting the wheels, finish off three spokes at a time; be handy in putting this dead colour on, and do not work it about much or you will have it cordy. Next get some ultramarine ground in turps, gold-size, and varnish, and give another coat; the colour which is left can be made into varnish colour by adding sufficient varnish to finish the job. This is put on when the first coat of ultramarine is dry, which will take from six to twenty-four hours, according to the quantity of varnish added. When painting the ultramarine, see that it is solid and not cloudy; when dry, and before varnishing, it should be flatted to smooth it down a little. In painting vermilion, colour all the parts which are to be red with a couple of coats of pure white lead; when this is quite dry, mix the vermilion in its pure state with gold-size and turps, and give it a coat of this dead colour. When dry, grind some more in boiled oil with a little liquid driers and finish with an oil coat of vermilion, as the colour will remain purer longer than if varnish had been added to it. In the case of blue and brown oil must not be added. Picking-out colours can be mixed dead or in oil: in dead colours the colour is simply ground in gold-size and turps, and the work can be varnished the same day. In fine-lining with oil colours these can be bought ready ground, and far purer than you could grind them, in tubes at any artist's colourman, the price ranging from 3d. to 6d. each; the dark colours can be mixed with dark gold-size, but the lighter colours must have a paler varnish added to it to help in drying. It can be varnished over the day after. Papers on coach painting are in preparation, and will appear as soon as room is found for them; do not be afraid of asking any questions, as hitherto coach painting has been a mystery, and still is, to a great many. "Coach Painting, by Arlot, is 6s., and Boag's "Guide to Coach Painting" is, now it is published, 12s. 6d.; if too much, wait until practical papers appear upon coach painting.—W. P.

Van Painting.—WRIGHT.—You do not state in your letter the kind of brown you wish the van to be painted in, as there are a great many varieties of

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browns, ranging from the dark vandyke up to the bright crimson lake, this last-named but expensive colour being merely a glazing colour, and does not possess much body, therefore, the under coats have to be finished in colour to match as near as possible the finishing coat of lake. If the van be a new one, paint and fill the woodwork up as directed in "Shop," No. 65, page 209, and the last coat of lead colour must be made up very dark so as to make the after coats look solid. Commence by giving the top, back, and side quarters a coat of dead black; when dry (in a few hours), give it a coat of black japan. If the japan sets too quick, so that you cannot work it about, add a little varnish or a drop or two of boiled oil—not too much, or it will never dry. The next day we begin to colour the carriage work and the panels; if the common browns are used, we can get any shade from light snuff to dark plum or chocolate by mixing the following: burnt sienna, raw sienna, umber, black, yellow and orange chrome; by mixing one or two of these colours you can get a distinct colour. This powder colour must be ground in gold-size and turps only, and will, when painted, dry in a few hours. Get a pot and place some of the colour in it, and after the dead colour is dry on the van, we put sufficient varnish to the colour in the pot to give it another coat of varnish colour; this last coat is merely a glaze, but should have sufficient body in it to cover. If, however, a lake is required (and it is generally used on vans), we first give it a coat of imitation lake composed of rose-pink and Indian red ground in turps, boiled oil, and liquid driers; the next day grind the crimson or purple lake very fine in gold-size and turps, and give it a coat of lake, afterwards finishing in varnish colour; leave for a few days to dry, then rub the mouldings level with stone and pick them out black, first with dead black, second with black japan. Next flat the whole of it down with a wet cloth and pumice-stone powder, doing a little at a time, and washing each piece off well and wiping it dry, or the water will stain. We then pick the wheels, springs, and shafts out with dead black; when dry, give the van and carriage work a coat of varnish; leave for a week if possible to dry, then flat or scour the varnish down again. It is now ready for picking out or fine lining; we therefore edge the black with a fine line of vermilion, lemon or yellow chrome, or pick it out with a quarter line of vermilion in the centre of two fine lines of white, or there can be centre and fine lines of red according to taste. The inside of the van will be painted light buff. The reason why varnish is flatted with powdered pumice-stone wet is to get it smooth and dull so that the last coat of varnish will flow out and not cess, as it certainly would if not flatted. When the fine-lining has been done and quite dry, we varnish the body and carriage work in a warm room well ventilated at the top and free from draughts, keeping the heat at a temperature from 65 to 70 deg. until the varnish is set and dry.—W. P.

Cornish Valve.—B. W. W. B. (*Whaley Bridge*).—Unless you give more particulars I cannot tell whether the valve is to act as an admission valve to the steam casing merely, or in place of slide valves. And what of cylinder dimensions, steam pressure, etc.? 20 h.-p. may mean anything. But if you know what volume of steam has to pass through the valve at each lift, you can deduce diameter from that. When the lift of the valve is one-fourth the diameter, it is fully open. There are sketches of some Cornish valves in WORK, Vol. I., page 513, though forms are modified. If you give fuller particulars, I will sketch out a suitably proportioned valve.—J.

Watch Parts.—C. A. B. (*London, E.*).—Screw Ferrules.—For ordinary work you might manage with about three screw ferrules; one large, about $\frac{1}{4}$ in. diam., one $\frac{3}{16}$ in., and one $\frac{1}{8}$ in. These are generally made in two pieces to hold the pinions, etc. You merely unscrew the two screws, and pass the pinion, or whatever you wish to turn, between the two halves and screw up tight; file up a centre on each end, and begin the turning. Wax ferrules are simply thin brass or ivory with a hole in the centre and a groove turned on its edge. The article (pinion or cylinder) being filled with sealing wax, the ferrule is made slightly warm (and the waxed article too) and dropped over the pinion or cylinder and held in place till cool; then commence turning as with screw ferrule. Wax ferrules are used on very short or awkward pieces where you cannot put a screw ferrule. Bows.—Gut is used for large work and ferrules, and horse hair for small work and ferrules where gut will not go. For turning a Geneva centre pinion, get a piece of round steel wire larger than the hole in pinion, run a centre on each end, then harden and temper to a purple colour; broach out the hole in pinion till the old set hands arbor fits it nicely. Now turn the piece of wire you tempered down to fit the hole (having previously, of course, put on a screw ferrule), and see that it fits nicely all the way through the pinion, then proceed as if it were a solid pinion. I shall be pleased to advise further if necessary.—A. B. C.

Fret Machine.—T. W. R. (*Kendal*).—The idea of the fret machine which you suggest seems feasible enough, but there are several details which will have to be modified considerably if your sewing-machine stand is only of the ordinary light description. In saying this, it must be understood that these points can only be determined by actual experiments, which, of course, I cannot undertake to make. One of the chief modifications which seems necessary is the distance at which you purpose placing the pin on the wheel J. If this pin is, as you say, to be about $2\frac{1}{2}$ in. from the centre, you will get a saw stroke of 5 in. How you are to manage this with a fret saw of the usual length is beyond me, even supposing that the fly-wheel is heavy enough, and your strength sufficient to drive it. About 1 in. from the centre will probably be nearer the mark. The length of the rod K is not of much consequence, but be careful not to have it so long as to have the board D in the way of your knees when working the machine. It ought to do as well by carrying it downwards as upwards. The bar F, I am afraid, would not be a sufficient support for the arms of the saw when you are cutting stuff. In turning the wood to the saw there would be an inevitable tendency to twist the back of the frame, which, I fancy, would be against accurate work. You could, however, easily carry out from the back of the table a board on which guides could be fixed for the back of the saw-frame to work in. They would obviate any tendency of the frame to swing round, and diminish the risk of the rod F jamming. This could be prevented by making F round instead

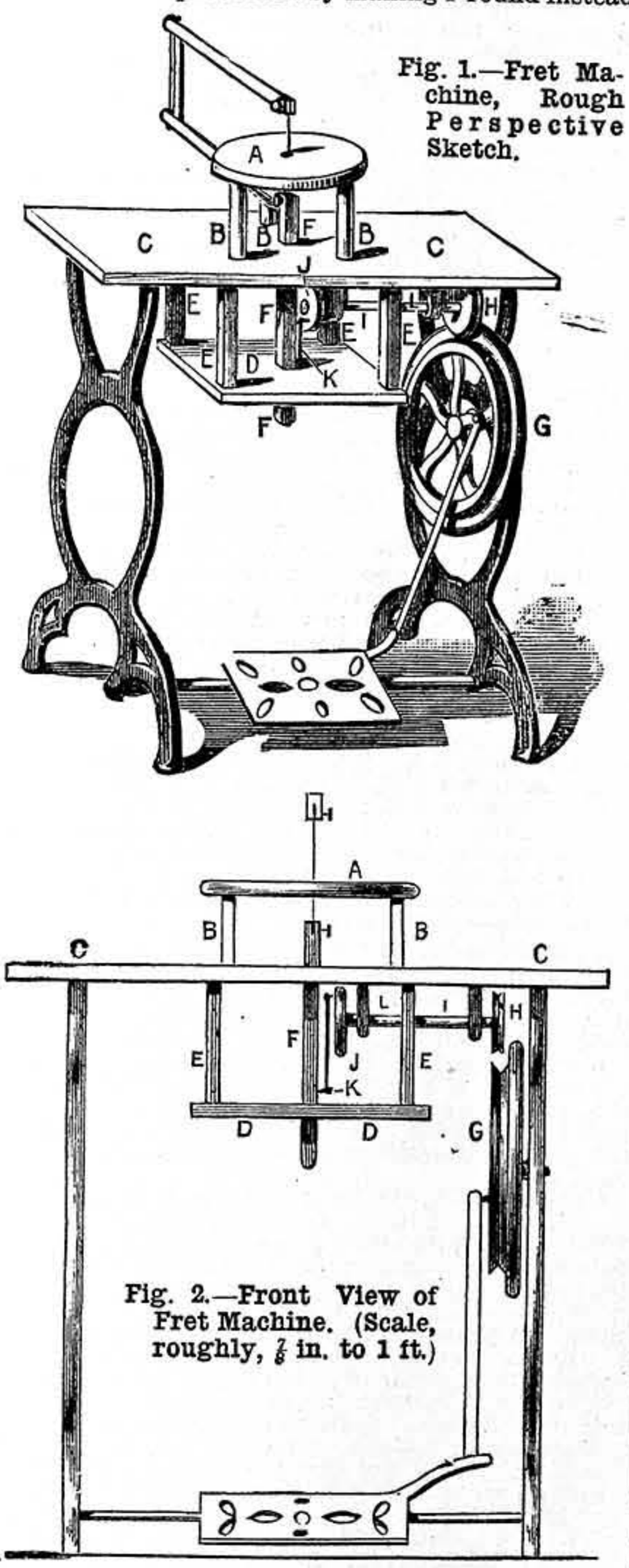

Fig. 1.—Fret Machine, Rough Perspective Sketch.

Fig. 2.—Front View of Fret Machine. (Scale, roughly, $\frac{7}{8}$ in. to 1 ft.)

of square in section. I do not, of course, know whether you intend making most of the parts of wood—*i.e.*, all that can be—or whether you intend them to be of metal. I, however, imagine the former from your sketches, and if so, the cost of the machine may be less than that at which you could buy one, otherwise it would probably be more economical to get one ready made. The tilting-table may be dispensed with, as it is of comparatively little use, even for inlaying purposes. For ordinary fretwork it is not required. In any case the table should only be made to tilt sideways. Write to the Britannia Company, Colchester, for one of the supports they use for their tilting-table. It will cost you a mere trifle, and you will probably have no difficulty in understanding how it is to be fixed, and in doing what is necessary. We are always pleased to assist our readers, so you need not look on your inquiries as an offence. I wish all inquirers in "Shop" would be as lucid in stating what they want to know, and, whenever they can, would follow your example of sending a rough drawing or two. Inquirers can then be helped more satisfactorily to themselves and with infinitely greater pleasure to the members of the staff to whom the questions may be submitted, than is sometimes the case. I wish you success in your efforts to make the machine, and shall be glad to hear how you succeed.—D. D.

Dry Battery.—D. O. W. (*Ipswich*).—I have not had any experience with the dry battery described on page 639 of *Cassell's Magazine* for 1885, so cannot say what the relative proportions of the ingredients may be, nor how it will compare with the Leclanché cell, nor can I say anything about the solution of zinc chloride and ammonium chloride employed in moistening the mixture of manganese peroxide, ferric oxide, and plaster of Paris. The cell appears to be much like the Gassner patent dry battery, and is most likely covered by Dr. Gassner's patent. The lasting qualities of the Gassner have been recently tested by me, and I can highly recommend it I put a small cell, $6\frac{1}{2}$ in. by $3\frac{1}{2}$ in. by $1\frac{5}{8}$ in., on a 2 in. bell and kept on ringing day by day at the rate of nine hours a day until I got 118 hours' work out of the cell. The power of the Gassner is restored by charging it with an electric current as we charge an accumulator. The battery is sold by Messrs. T. Gent & Co., Faraday Works, Leicester, and wholesale by Mr. P. C. Brewster, 12, Addle Street, London, E.C.—G. E. B.

Electric Alarm for Clock.—F. T. (*Silvertown*).—The article on "Electric Time Alarums" appeared in No. 32, published on October 26th, 1889. All back numbers of WORK may be obtained by ordering them of your newsagent or bookseller.—G. E. B.

Dynamo for Lighting Lamp.—R. W. D. (*Poplar*).—A small dynamo for lighting one 16 c.-p. lamp, and with power to spare up to 20 c-p. if required, should be of the following dimensions:—Cores of F.Ms., Siemens pattern, 5 in. by 4 in. by $\frac{5}{8}$ in. Laminated armature, H pattern, 4 in. by $1\frac{3}{4}$ in. F.Ms. wound with $4\frac{1}{2}$ lbs. No. 22 double cotton-covered copper wire, connected in shunt with the armature coil. Armature wound with ten ounces No. 20 double cotton-covered copper wire. The armature should be driven at a speed of 2,500 revolutions per minute. To light up a 16 c.-p. lamp this machine will absorb $\frac{1}{10}$ horse power, and to light up a 20 c.-p. lamp will take $\frac{1}{8}$ horse-power. I do not expect you will get enough power out of your small model engine to drive the machine, but you can try it when you get the machine.—G. E. B.

Battery for Lighting Model Church.—VEGA (*Weston-super-Mare*).—You will require quite 4 pint bichromate cells in series to light up a $2\frac{1}{2}$ c.-p. 8 volt lamp. I do not see how you can improve upon the battery used by you last summer for the same purpose. If you could make up some papier-mâché cells of flat-square form, and make them sound and acid-proof, you might lessen the weight of the battery and the space occupied by it. Directions for working in papier-mâché were given in the early part of Vol. I. of WORK. The cells may be made acid-proof by soaking them, when quite dry, in melted paraffin wax for at least half an hour, then set aside to cool and harden.—G. E. B.

Safe Carrying Capacity of Wires for Electric Lighting.—F. E. S. (*London, S.W.*).—I am trying to meet the requirements of young men like yourself, who have to do wiring for electric lighting installations. An abundance of information on the subject lies scattered about in books, but I do not know of any one book in which you could find it all put as you would wish to have it. Your difficulty seems to lie in your inability to reconcile the decimal system of measurement with the common practice as known to yourself. I really think you will have to surmount this by learning the decimal system, as this is more correct than the old plan of describing diameters by quarters, eighths, sixteenths, thirty-seconds, sixty-fourths, and so on. In the decimal system, each whole unit is divided into tenths, and multiples of tenths, the most popular division being 100. By this system a $\frac{1}{4}$ is represented by ·25, $\frac{1}{2}$ by ·50, and $\frac{3}{4}$ by ·75; the point before each figure denotes that the figure is the fraction of 100. It looks much better on paper than $\frac{25}{100}$, $\frac{50}{100}$, and so on. When the whole unit (be this one inch, one ohm, one volt, one ampère, or any other single unit of measurement) is divided into 1,000 parts, the $\frac{1}{4}$ is represented by ·250, the $\frac{1}{2}$ by ·500, and so on, three figures being used to the right of the decimal point, to indicate that the fraction is in 1,000ths. The measurements thus expressed are finer and more exact than those given in 100ths. When the unit is divided into 10,000ths there are four figures after the decimal point, as ·2500 to express $\frac{1}{4}$. A little thought on your part whilst reading this will convince you of the superiority (in point of exactness) of the decimal system. In common systems of measurement we have nothing to express our ideas should the measurement exceed by a hair's-breadth the figures marked on our rules, but by the decimal system we can express a shade larger than $\frac{1}{4}$, by either 26, or ·251, or ·2501, and thus place on paper an exact record of the measurement. This exactitude is necessary in all electric work hence "the elaborate system of decimals used" in the tables of which you complain. Nearly all wire tables give the nearest number in the Birmingham wire gauge to the decimal measurements therein stated; but this antiquated gauge is the most inexact of any known, and therefore fails to express exact sizes. I give herewith a table of the safe carrying capacity of copper wires and cables employed in electric lighting, but must ask you to give your mind to a study of the decimal system of measurement, as this will be in the future, even more than at present, the universal system understood and used by all electrical operators. In the

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first part of this table I give the sizes of copper wires in the Birmingham wire-gauge and also their equivalents in decimal 1,000ths of an inch. I also give the economical carrying capacity of each wire, and its safe carrying capacity as well. The carrying capacity is also put in the cables as half their safe carrying capacity, this being found the most economical calculation in laying wires. The information given in the latter part of this table has been obtained from Messrs. J. E. Hartley & Co., Birmingham.

CARRYING CAPACITY OF COPPER WIRES.

B.W.G.	Decimal.	Carrying Capacity in Ampères.	Safe Carrying Capacity in Ampères.
No. 8	·165	20·1	40 amps.
,, 10	·134	12·8	28 ,,
,, 12	·109	8·5	18 ,,
,, 14	·083	5·	10 ,,
,, 16	·065	3·2	6 ,,
,, 18	·048	1·8	3 ,,
,, 20	·042	1·0	2 ,,
,, 22	·028	·6	·5 ,,

CARRYING CAPACITY OF ELECTRIC LIGHT CABLES.

Strands of Wire.	Size of each Wire B.W.G.	Carrying Capacity.
3 strands of	No. 25	·9 amps.
3 ,,	,, 23	1·4 ,,
3 ,,	,, 22	1·9 ,,
7 ,,	,, 25	2·2 ,,
7 ,,	,, 23	3·2 ,,
7 ,,	,, 22	4·4 ,,
7 ,,	,, 21½	5· ,,
7 ,,	,, 20½	6·1 ,,
7 ,,	,, 20	7·2 ,,
7 ,,	,, 19	8·9 ,,
7 ,,	,, 18	12·8 ,,
7 ,,	,, 17	17·4 ,,
7 ,,	,, 16	22·9 ,,
7 ,,	,, 15	28·9 ,,
7 ,,	,, 14	35·6 ,,
19 ,,	,, 20	19·8 ,,
19 ,,	,, 19	21·3 ,,
19 ,,	,, 18	34·9 ,,
19 ,,	,, 17	47·9 ,,
19 ,,	,, 16	62·4 ,,
19 ,,	,, 15	78·9 ,,
19 ,,	,, 14	97·3 ,,
19 ,,	,, 13	128·2 ,,
19 ,,	,, 12	164·7 ,,
37 ,,	,, 16	121·9 ,,
37 ,,	,, 15	154·1 ,,
37 ,,	,, 14	190·9 ,,
37 ,,	,, 13	251·6 ,,
61 ,,	,, 13	416·2 ,,
61 ,,	,, 12	531·9 ,,

Should you meet with any other difficulty, I shall be pleased to help you if you will write again.—G. E. B.

Zither.—S. S. (*Stockton*).—You cannot string a zither with piano strings, but must procure a set of melody strings (5), and also a set of accompaniment strings (26). These latter are a mixture, some silver, some copper and others gut. The two sets complete may be had for five or six shillings, according to quality. Send to Chilvers & Co., St. Stephen's, Norwich, if you cannot procure them in your own town. Tutors cost from half-a-crown upwards.—R. T.

Camera.—A CONSTANT READER.—If you have a camera for sale you cannot do better than advertise it in WORK.

Chemical Apparatus.—PROBYN.—This subject has not yet been treated in WORK in the way you indicate.

Patent Envelope.—TEBB STREET.—You cannot do better than consult a wholesale stationer concerning your invention.

Diamond Chips.—W. J. C. P. (*No Address*).—I am no authority on drilling china, etc., and I do not quite understand what W. J. C. P. means by "*black* diamond chips." I assume, however, that he means "bort chips," which we use for turning emery wheels, hard steel, and similar work. Bort is a mineral almost, if not quite, as hard as diamond, and is much cheaper. I do not know what firm would be most convenient for W. J. C. P., but Woods & Toussaint, 54, Spencer Street, Clerkenwell, London, are dealers in all kinds of diamond tools, etc., and would, I think, be able to supply him with everything he requires.—DAMON.

Camera.—DERF.—In your case, a half-plate Lancaster camera would be a suitable instrument until you became thoroughly conversant with the process. The principal points to look to are: firstly, that the camera is thoroughly sound; secondly, that the focussing screen and sensitive plate accurately register; thirdly, that the whole is firm and rigid when set up. As a rule these conditions exist in most cameras, or if, by accident, they do not, a little alteration will put them right. The less intricate the make of the camera, the better it is for beginners. Movements that are especially useful in a camera are the swingback, and means for raising and lowering the lens. There are scores of cameras in the market that are all that can be desired as working instruments, from 50s. upwards. A good rectilinear lens, suitable for the size of camera, may be obtained from any dealer. To make satisfactory pictures a good lens is *imperative*. If you get a price list from any photographic dealer—Fallowfield's, for example—you will be able to estimate the cost of the outlay to a trifle. The best, or one of the best elementary books is "Burton's Modern Photography." Abney's works on the subject are, for those who know the elementary part, the best published.—D.

Hints on Boot Finishing.—S. T. (*No Address*).—I suppose I am to understand by the first part of your letter that you have made a pair of boots and have got all the stuff on, and that you want to know how to finish with a bevel edge, or, anyway, a light edge. Well, this being the case, you cannot make them much lighter than what they are, as the leather should have been fitted to suit your requirements before they were stitched. But, anyway, to finish them off to make them appear as light as possible, trim them round the edge with the knife, then pare, rasp, buff, and sand-paper, as explained in my first paper on "Boot and Shoe Repairing," in No. 112, Vol. III. of WORK. Then, if you have not a welt knife, hold the ordinary knife (with the point flat on the welt) between the thumb and finger, letting the finger form a guard, on the edge of the sole, and trim off the rough edge that the preparing of the edge has thrown on to the welt side, taking off as much as you can without cutting off the heads of the stitches, and then trim as much as you can off the bottom (or sole side). This should be done even all round, so that the edge may be the same substance all round. The welt side can be rubbed down with the bone, and the bottom filed, to make it smooth, being careful not to lift up the channel again. You now paste and ink them in the usual way. With regard to ironing, you must, if you want a good result in either sewn or stitched work, only use the fore-part iron on the sole side. The welt iron I spoke of in my last answer to you is, as stated there, only used for the welt side (from joint to joint), and it is called a jigger-iron. I have given a description of it in the article which appeared on "Boot and Shoe Repairing" (see page 516). It is this iron (or the jigger side of a double iron) that gives the bevel appearance that you saw in the strong-stitched boots you spoke of. I think if you peruse the answer to H. G., in

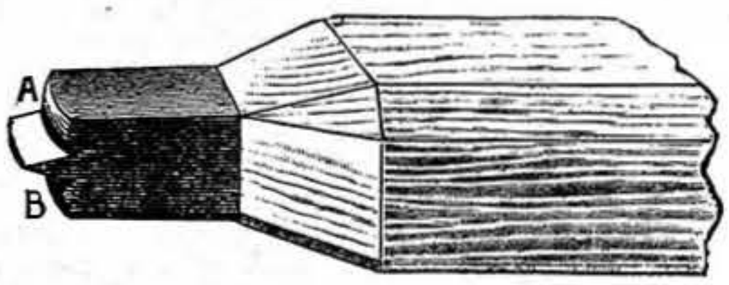

Fig. 1.

Fig. 2.

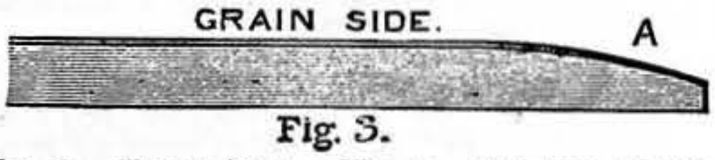

Fig. 3.

Fig. 1.—Jigger-iron. Fig. 2.—Skiving Leather for Bevel Work. Fig. 3.—Appearance when Stitched, etc.

No. 97, Vol. II. of WORK, in "Shop," you will find the answer suited to your question. The piece is, as there shown, taken off the grain side. You also ask, should "it be taken off down to about $\frac{1}{16}$ in. at first, and then on the grain side, or flesh side, before sewing into nil, as you do not understand my answer?" You asked in the seventh question of your last (p. 252, No. 120, Vol. III.), if the welt should be thinned down before sewing in? If you refer to the above, you will see I say, "Yes"; but not to $\frac{1}{16}$ in., for you should always buy welts as near the substance of what they are going to be sewn in as you can, for to take a stout welt down to $\frac{1}{16}$ in. would weaken it a deal too much. The welt should have just the thinnest possible layer taken off the grain side, and then taken to the required substance from the flesh side; but this should not need to be much. For bevel, or any light work, always buy light and tight welts. In fitting the sole for bevel work (that is, prior to putting it on the boots), take a piece off all round from the flesh side, to the substance you will require to fit your bevel-iron, allowing for the welt, as shown at A, Fig. 2, or even thinner; and after it is skived off even all round, and put on the boot, it can be hammered at the edge to make it lay flat to the welt, and then when stitched it will look as though it had been taken off the grain side as shown at A, Fig. 3. A bevel-iron is similar to a double-iron, only it has a longer and not quite such a straight guard for the sole side. Your next question, I am sorry to say, I do not quite understand: "How to finish the edge of a pair single sole, pegged waist, thinned down for any iron, and feathered on the welt part." To finish a single sole you need a pump-iron. Fig. 1 is the shape generally used; it is a double pump-iron, A and B being two different substances. This is used, of course, for sewn work. But now I do not know which you mean—the sole or pegged waist thinned down and feathered on the welt part. Pumps have no welts or waist either if they are pegged, and the term feathered is only applied to the inner sole. I am sorry, but an answer would only be at random. If you will now refer to page 845, No. 104, Vol. II. of WORK, you will see that in the answer to POOR SNOB it is stated that the quarter pattern should be cut large enough for the vamp and golosh quarters to overlap to allow for skiving and seam. So you see in cutting the leather you can cut true to the pattern. Some do fold the vamp to cut it equal both sides; but I advise (as the pattern is cut in this way, and is therefore equal) cutting as above, and saving the time of what is called "trenching." You put the pattern on the leather, and a lead weight on the pattern, and you will find it the easiest and best way. To spring a boot, hold the toe in one hand and the heel in the other, putting the waist against the knee, and pulling both toe and heel equally towards you, as you would in breaking a stick, only it must not be done hard. The beating-down is done by holding the upper away from the welt and lightly tapping it down all round on the top of the edge of the inner sole. Its use, as you ask it, is to repair the damage you do in pulling out the last, and to make the feather even and lay flat on the welt. But if ever you have done it, or seen it done, did you not see that it was an improvement to the general appearance of the boot? That is why it is done.—W. G.

Field Glass.—H. G. H. (*Saxmundham*) says he has "purchased a pair of field glasses which are very weak," and asks, "can he buy stronger glasses and fix them himself, and where, and at what cost, etc.?" This is one of those letters which, to say the least, is not easy, if not impossible, to answer. Is the glass weak in magnifying or defining power? Two very different things. Glasses of any strength or quality can be procured of any optician; but how can one tell if H. G. H. can fix them himself? Are the lenses screwed in cells or fixed in bezels? If the former, the work is easy; if the latter, a lathe and some skill are required to do the job. As to where the lenses can be bought, I have found Lancaster, of Birmingham, exceedingly obliging, and he can supply what you need. As to cost, they can be purchased from 6d. upwards, according to size and quality. If H. G. H.'s object glasses are all right, but the instrument does not magnify high enough, this can be remedied by employing an eye-piece of shorter focus. If the object glasses are common chromatic lenses, then nothing can be done to improve the definition but employing better lenses, which, at least, would cost about 5s. each. If the instrument is one for which a fair price was paid, then really the best plan would be to send it to a practical optician, such as the one I have named, and ask him to rectify it. If H. G. H. wishes to do the work himself, then Mr. Lancaster will supply the material needed. But from the letter, as a whole, I judge that H. G. H. has no knowledge of the kind of work requiring to be done; if so, he might ruin what after all is, but for some slight defect, a fairly good instrument. I think no one can give more definite advice without an examination of the instrument.—O. B.

Wardrobe.—AMATEUR.—An article on making a wardrobe appeared in No. 116 of WORK.

Cost of WORK.—AMATEUR.—The volumes of WORK bound cost 7s. 6d. each. The twelve parts that are comprised in the volume cost 6s. The fifty-two numbers, of which each volume is composed, cost 4s. 4d.

Gesso Work.—H. G. will find it the best plan to purchase the gesso ready prepared from the Society of Artists, Bond Street, W. It saves trouble, and for small pieces of work (such as a frame) the difference in cost is not worth thinking about. It is difficult to give quantities, but the ingredients must be warmed over the fire to form a thickish batter. The gesso is laid on with a brush, and often modelled with the end of the handle. It would be a help to H. G. if he were to see the specimens at the Society of Artists; but, after all, these only show a few of the ways in which gesso can be employed for decoration. I have never tried using it as H. G. suggests; but it probably might answer his purpose, though it certainly would not be such an artistic decoration as if a brush were used. Full directions were given in WORK, September 7, 1889, December 28, 1889, and February 15, 1890.—C.

Galilean Telescope.—F. W. L. (*Southborough*).—To make the telescope you describe, you will need an object glass 2½ in. in diameter and 25 in. in focal length (which will cost you from 4s. 6d. to 25s., according to whether it is a common single lens, or a properly corrected achromatic lens), and a plano-concave eye-lens of ½ in. focal length (which will cost about 2s.). These lenses can be obtained through any working optician. The foregoing prices are taken from the price list of Messrs. James Lancaster & Son, of Birmingham. But after you have bought your lenses and followed out your plan, the telescope is not likely to be of the slightest practical use to you. The field of view would be altogether too small. A Galilean telescope serves excellently as a field or opera glass, where small magnifying powers only are needed; but it is seldom used nowadays for any other purpose. You had better let the Editor know exactly what you want the telescope for, and then I will tell you the best way to set to work. To follow out your present plan will be to waste money and to court a serious disappointment.—E. A. F.

Graining and Decorating.—EXILE.—To properly advise a "young grainer and decorator what books to study" would be easier done if you had given some particulars of the extent of your present knowledge and skill. As a general instruction, I would advise you to read and study anything and everything bearing upon form and colour, and particularly all that connects the same

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with the applied and industrial arts. To particularise books and prices, I can easily give you a few for you to make regular companions of. Subscribe to the *Journal of Decorative Art*, and write its editor—who is himself a very experienced and rising specialist in all branches of decorative art—for a list of publications. The price of this is 7d. monthly, from 15, St. Ann Street, Manchester, and all booksellers. Send also to Crosby Lockwood & Co., Stationers' Hall Court, E.C., for their list, and of these, Field's "Grammar of Colouring" (3s. 6d.) is one of the most useful. Then save your money, and buy the late Owen Jones' "Grammar of Ornament" for cash, about £4 (published at 5 guineas, and the original edition at 12 guineas). Then on "from strength to strength" to Ogden Rood's "Chromatic Equivalents" (5s.), of Kegan Paul, Trench & Co.; and also Prof. Church's revised "Colour" (3s. 6d.), of Cassell & Co. Then write me again; but in the meantime you may gather a few crumbs from WORK.—DECORATOR.

Sun-dial.—A. R. (*Birmingham*) asks "how to find the angle of the gnomon for the latitude of this city (Birmingham) for a horizontal sun-dial." It must be understood that the angle for a gnomon in a given place is the same as the latitude of the place. If you refer to an index of latitude and longitude, you will see that Birmingham is 52½° north, which must be that of the gnomon; in other

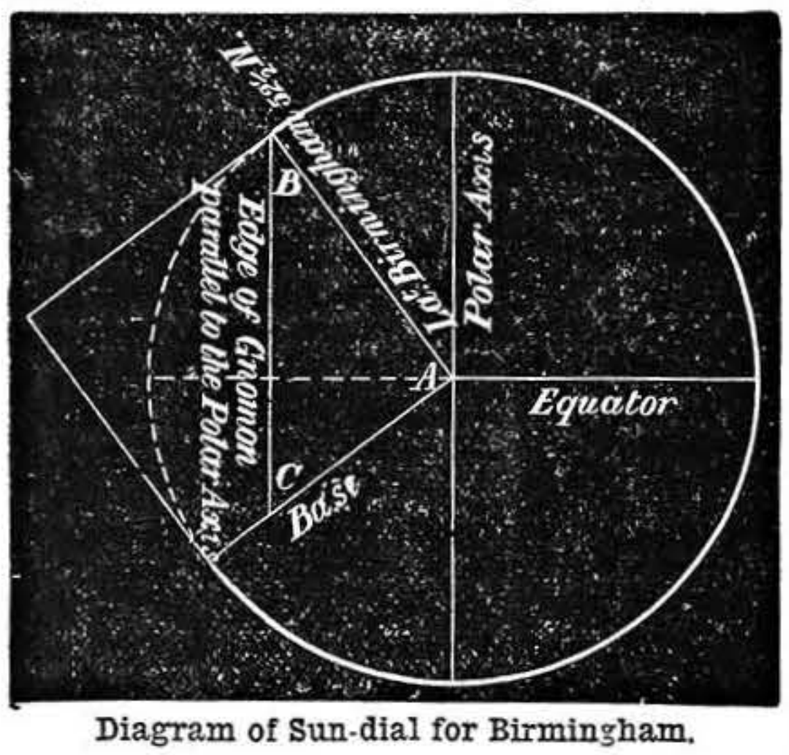

Diagram of Sun-dial for Birmingham.

words, the edge of the gnomon casting the hour shadows must be parallel with the polar axis. There are various ways of finding this, all simple; this is as good as any: draw a circle, or, better still, use a map of the world; draw a line from the centre to 52½°. Place a square piece of paper or metal, with the point, A, at the centre, with the edge, A B, along the line from the centre to 52½°. Now draw a line, B C, parallel with the polar axis, which gives us the angle required. A C is the base, and B C is the edge for the hour shadow. A B and A C must be perfect right angles. A. R. asks for a diagram, which I subjoin, if needed.—O. B.

Tarred Wall.—E. J. (*Barnsley*).—Were it woodwork, it might be worth your while to remove the objectionable stuff by dry scraping, or "perishing" it off by heat or solvent: but for a brick wall it is the last thing I would recommend you to do. Your best plan, I think, is to coat it with limewash, and if it is required to stand much rain and weather, stir some hot Russian tallow into it. Several coatings of this would surely make it light and clean enough looking for you, and at one-tenth the cost of cleaning and oil-painting. Give your orders to a local bookseller, or if he doesn't show proper knowledge and enterprise in procuring books, order them at a station bookstall. Smith's representatives will usually get anything with but little trouble.—F. P.

Cement.—W. V. C. (*Dublin*).—The ordinary plaster of Paris is the usual article employed in fastening the glass and metal parts of lamps together, and I do not think it could be substituted by anything cheaper or better, as well as for the purpose you mention. Plaster may be mixed with patent knotting with advantage for some purposes, but, if anything, it is more objectionable to handle thus. Plumbers' putty (made with white lead stiffened up with red lead) is also used for fastening plugs, etc., to glazed earthenware, as aqueous fluids would not affect it like plaster.—F. P.

Washable Wall Papers.—A STAINER (*Glasgow*).—The information you desire I am unable to give you, and I scarcely think it is likely to find its way into print, unless a reader of WORK employed in making the "sanitary" papers is able and willing to give the process. The well-known firm of paper-stainers, Messrs. Heywood & Higginbotham, were, I believe, the first to make "sanitaries," and I believe it was then, to some extent, a "patent" process. Most of the chief paper-stainers now make them: Lightbown and Aspinall, especially, do a large business with them. I have heard it remarked that some "hot-press" process is used, but personally have no knowledge. Doubtless there is more in it than a "vehicle," probably expensive machinery. Stather's washable goods (Hull) are different to the ordinary sanitary, being printed in materials of an oil-paint nature.—F. P.

Protected Invention.—WORKING MAN.—As you have obtained provisional protection for your invention, whatever it may be, for nine months, you can apply to private firms, who may be likely to take it up without the intervention of a patent agent.

III.—QUESTIONS SUBMITTED TO CORRESPONDENTS.

Lathe for Umbrella Sticks.—E. E. (*Walsall*) asks:—"Will any reader inform me through 'Shop' where I could get the best lathe for cutting the spring-holes in umbrella sticks?"

Lapidary Work.—SPES MEA writes:—"Would some reader of WORK tell me how I can best proceed to cut some stones that I have picked up during my rambles on the sea-shore, and where I can best obtain the necessary tools, etc., for this purpose?"

Colouring Bright Steel Surfaces.—BARIUM writes:—"Will some reader be good enough to inform me how this can be done without greatly heating the articles? The process must be cheap, as I want to colour about 8,000 articles weekly. I want a bluish self colour, similar to that of a watch spring."

Waterproof Glue.—LONDON asks where "waterproof glue can be procured."

Still.—LONDON asks for "particulars of a still for distilling wood."

Glass Blowing.—SPES MEA writes:—"May I take the liberty of asking some of the many readers of WORK to favour me with information respecting the apparatus necessary for blowing glass on a small scale, and the best place to obtain them?"

Demon Water Motor.—SPES MEA writes:—"Would any kind readers of WORK who have actually used the above motors, kindly inform me as to the general capability, strength, durability, efficiency, and reliability of these motors for turning grindstones, circular saws, etc., and whether in construction they are really a reliable motive power for the purposes mentioned. I should add that I more particularly refer to the larger-sized motors, namely, the ½ and 1 horse-power."

*** I reply to this at once by referring SPES MEA to a notice of the so-called "Demon" Water Motor, which appeared in WORK, Vol. III., page 122. This is a sufficient answer, and no replies from correspondents, should there be any, will be inserted.—ED.

IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Bamboo Work.—C. R. K. writes, in reply to E. C. W. (see page 446, No. 132), that he "can find everything he requires at Messrs. Heinrichs & Co., Old Street, E.C."

Wire Crimping.—THE PHOSPHOR BRONZE COMPANY write:—"We can supply castings in phosphor bronze, but we require a wooden pattern to make same from. Anyone could either supply us with the pattern, or if a wax pattern was sent, we could get a wooden one made and charge simply the cost price of same."

Boiled or Unboiled Oil.—H. E. (*Croydon*) writes, in reply to A WEEKLY SUBSCRIBER (see page 459, No. 133):—"It depends entirely upon what colours you intend using for your external painting. If you use a colour of which white lead forms the substratum, it is not usual to use 'boiled' oil. If you are using dark colours they should be mixed with it, as otherwise they lack the body of 'white lead' paints. You will get no paint to look like varnish after two or three years, however you may mix it. If a glossy appearance (permanent) is desired, you must varnish the work, and even this will dull very considerably after two or three years' exposure to the atmosphere."

Tuck-pointing.—H. E. (*Croydon*) writes, in reply to SLATER:—"If you wish to tuck-point the front of a red brick house, it is usual to rake out the mortar from the joints, give the bricks a coat of venetian red in turps, and then 'flush up' the joints with black mortar (made by mixing vegetable black with the ordinary mortar). The 'tuck-pointing' proper consists of laying fine lines of white mortar neatly and regularly over the centres of the joints. This is done by means of a special trowel and a straight-edge. Stock facings are coated with yellow ochre previous to 'flushing;' but it is not usual to colour *malms*. The term is apparently derived from the German 'tuchen' (to fold or press in), or 'zucken' (to shrink in). I need scarcely say that it is not a novice's job."

V.—BRIEF ACKNOWLEDGMENTS.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—R. H. (*Bishop Auckland*); EQUATOR; MAGPIE; P. A. (*Newquay*); WATER MOTOR; NIL DESPERANDUM; J. H. (*Bishophill*); E. G. (*Hereford*); R. K. B. (*Woolwich*); BRASSY; E. M. (*Blackheath*); R. R. (*Liverpool*); ENGRAVER; J. A. B. (*Camberwell*); F. H. (*Battersea*); IGNORAMUS; A. D. (*Sunderland*); F. M. (*Portsea*); G. B. (*East Dulwich*); J. H. J. (*Birmingham*); A. B. (*Stoke-on-Trent*); CARR DYKE; E. F. C. (*Dartmouth*); G. C. (*Brighton*); F. G. W. (*Kettering*); J. H. (*Newchurch*); JOINER; G. L. (*Gateshead-on-Tyne*); CLERK; CLOCK; S. G. T. (*Penarth*); VACUUM PAN; F. C. (*Morriston*); A READER; APPRENTICE; AMATEUR; AN ADMIRER; E. D. R. (*Camberwell*); A. R. P. (*West Hampstead*); A READER OF "WORK"; AN AMATEUR; A WOULD-BE PICTURE-FRAMER; CLERICUS; J. F. (*Glasgow*); L. B. (*Wells*); C. P. T. (*London*); R. J. (*Gainsborough*); J. P. (*Darlington*); T. S. (*London, N.*); OLLGARTNEY; J. C. B. (*King's Lynn*); G. H. L. (*Salford*); A. R. (*Scorrier*); G. B. (*Stoke*); T. H. S. (*Newport*); J. H. P. (*Wordsley*); E. R. D. (*Sherborne*); R. G & CO. (*Salop*); SHOPITE; CHRONOGRAPH; B. W. R. (*Liverpool*); CONSTANT READER; H. W. (*Stockport*); J. T. B. (*Hebden Bridge*); J. F. (*St. John's*); DRAUGHTSMAN; AJAX; J. H. M. (*Manchester*); T. B. (*Rochdale*); R. A. D. E. P. (*Harrogate*); YOUNG ENGINEER; W. T. T. (*Houghton-le-Spring*); W. W. (*Caverton*); D. O'S. (*Kerry*); J. S. & SON (*Ulverston*); L. T. (*Liverpool*); C. J. (*Chester*); C. H. C. (*Manningham*); C. S. L. (*Kirkcaldy*); T. R. B. (*Newcastle-on-Tyne*); J. R. B. (*Manchester*); R. B. (*Eltham*).

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Price List of Carpenters' Tools, containing nearly 400 Illustrations, free by post.—OSBORN BROTHERS, Tool Merchants, Portsmouth. [16 R

The Talmer does the Best.—Illustrated pamphlet of this perfect Hand Camera 2 stamps.—TALBOT AND EAMER, Blackburn.

Photographic Apparatus, list 2 stamps. Dark Slides, best quality, fitted to any camera: ¼ plate, 5s.; ½ plate, 9s. 3d. All sizes made.—TALBOT AND EAMER, Blackburn. [18 R

Fretwork Designs.—Books of 12, 7d. and 1s. 1d.; 40 smaller designs, 7d.; sample sheet of 6, 2½d. Fretwood from 4d. per foot.—TAYLOR'S Fretworkeries, Blackpool. [19 R

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